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**STUDY ON FOOD SAFETY ISSUES IN KEDAH,
MALAYSIA: A CASE ON FOOD SERVICE
OPERATORS**

FATIN AIMAN BT ABD LATIFF



**MASTER OF SCIENCE MANAGEMENT
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**STUDY ON FOOD SAFETY ISSUES IN KEDAH, MALAYSIA:
A CASE ON FOOD SERVICE OPERATORS**

By

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UUM
Universiti Utara Malaysia

**Thesis Submitted to
School of Technology Management and Logistics,
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Master of Science (Operation Management)**



Kolej Perniagaan
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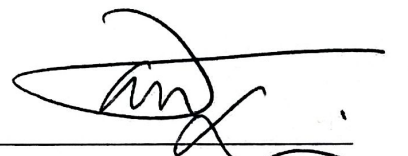
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ABSTRACT

Food poisoning has a significant impact towards the economic, environmental and social aspects. The complexity of global food poisoning cases has made the government and related food agencies established a new regulation as an improvement and to complement the previous food safety regulations. This research explored and explained the pattern and drivers of food poisoning cases in Malaysia. The present study demonstrated knowledge, attitude and practices (KAP) model as a theoretical research framework with the purpose to determine the true causes of food poisoning incidents occurred in 2013 that resulted in deaths which accessed on the KAP pertaining to food safety among food service operators, and thus concludes the level of food safety compliance in Kedah. In regards of the research instruments, the present study employed both qualitative and quantitative research designs, and it was conducted in two phases. In the first phase of data collection method, two experts from Food Safety and Quality Division, Ministry of Health Malaysia were selected as respondents for semi-structured interviews. Meanwhile, self-administered questionnaire surveys were deployed as the second instrument in the present study. A total of 360 questionnaire sets were distributed among food service operators in Kedah district including Kulim, Sungai Petani, Gurun, Yan, Alor Setar, Jitra, Kubang Pasu and Changlun. Both qualitative and quantitative techniques were used as systematic tools to test and validate the model. Findings of the present study demonstrated that the attitude of food service operators during food preparation processes were synonymous with the occurrence of food poisoning incidence in Kedah. Whereas food service operators' knowledge and handling practices has a significant relationship toward food handling practices and food safety standard compliance. The present study also highlights on the implications and limitations of the study as well as the suggestions for future research.

Keywords: Food poisoning, food safety regulation, KAP model, BeSS, Kedah

ABSTRAK

Keracunan makanan mempunyai kesan yang ketara kepada aspek ekonomi, alam sekitar dan sosial. Kes keracunan makanan yang semakin rumit di peringkat global menyebabkan kerajaan dan agensi-agensi makanan yang berkaitan menubuhkan peraturan baharu sebagai penambahbaikan dan melengkapkan peraturan keselamatan makanan yang sedia ada. Kajian ini meneroka dan menjelaskan corak dan punca kes keracunan makanan yang berlaku di Malaysia. Kajian semasa mengadaptasikan model pengetahuan, sikap dan amalan (KAP) sebagai rangka teori penyelidikan yang bertujuan untuk menentukan punca sebenar kejadian keracunan makanan yang berlaku pada tahun 2013, yang mengakibatkan kematian dengan mengakses KAP yang berkaitan dengan keselamatan makanan dalam kalangan pengendali perkhidmatan makanan, dan sekali gus menyimpulkan tahap pematuhan keselamatan makanan di Kedah. Mengenai instrumen kajian, kajian ini menggunakan reka bentuk penyelidikan kualitatif dan kuantitatif, dan telah dijalankan secara dua fasa. Dalam fasa pertama pengumpulan data, dua pakar dari bahagian Kualiti dan Keselamatan Makanan, Kementerian Kesihatan Malaysia dipilih sebagai responden untuk diwawancara secara separa struktur. Sementara itu, borang kajian soal selidik telah digunakan sebagai instrumen kedua dalam kajian ini. Sebanyak 360 set borang soal selidik telah diedarkan kepada pengusaha perkhidmatan makanan di sekitar Kedah termasuk daerah Kulim, Sungai Petani, Gurun, Yan, Alor Setar, Jitra, Kubang Pasu dan Changlun. Kedua-dua teknik kualitatif dan kuantitatif digunakan sebagai alat sistematik untuk menguji dan mengesahkan model. Penemuan kajian ini menunjukkan bahawa sikap pengendali perkhidmatan makanan semasa proses penyediaan makanan sinonim dengan berlakunya kejadian keracunan makanan di Kedah. Manakala tahap pengetahuan dan amalan kebersihan pengendali perkhidmatan makanan mempunyai hubungan yang signifikan terhadap amalan pengendalian makanan dan standard pematuhan keselamatan makanan. Kajian ini juga menyoroti implikasi dan batasan kajian serta cadangan penyelidikan masa depan.

Kata Kunci: Keracunan makanan, peraturan keselamatan makanan, model KAP, BeSS, Kedah

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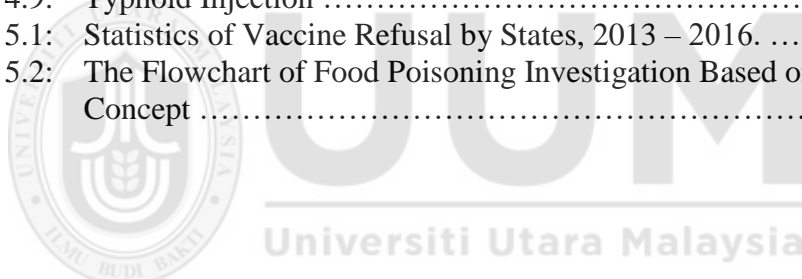
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LIST OF ABBREVIATIONS

BeSS	Bersih, Selamat dan Sihat
CDC	Centres of Disease Control and Prevention
EFA	Exploratory Factor Analysis
EFSA	European Food Safety Authority
F&B	Food and Beverages
FHTS	Food Handlers Training Program
FoSIM	Food Safety Information System of Malaysia
FSC	Food Safety Certificate
FSMS	Food Safety Management System
GFSI	Global Food Safety Initiatives
GHP	Good Hygiene Practices
GMP	Good Manufacturing Practice
HACCP	Hazard Analysis and Critical Control Point
ICU	Intensive Care Unit
IQDAR	Darul Aman Al-Quran Institute
JAKIM	Jabatan Kemajuan Islam Malaysia
JKN	State Health Department
JPN	State Education Department
KAP	Knowledge, Attitudes and Practices
KENDIRI	Self Examination Program
KPM	Ministry of Education
MeSTI	Makanan Selamat Tanggungjawab Industri
MOH	Ministry of Health Malaysia
MyFoodNet	Malaysian Foodborne Diseases Network
PHE	Public Health England
PKD	District Health Officer
PMR	Penilaian Menengah Rendah
PPD	Education Officer
RTE	Ready-To-Eat
SLPM	Sekolah Latihan Pengendali Makanan
SME	Small and Medium Enterprise
SPSS	Statistical Package for the Social Science
TBP	Theory of Planned Behaviour
UUM	Universiti Utara Malaysia
WHO	World Health Organization

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CHAPTER 1

INTRODUCTION

1.1 Chapter Overview

This chapter discusses issues related to food safety measures focusing on food prepared by food businesses in Malaysia. The chapter begins with the research background, followed by problem statement, research questions and research objectives. Then, the scope and significance of the study are also discussed. The key terms and the organization of the thesis are provided at the end of this chapter.

1.2 Background of the Research

Food industry is complex yet it is very important to ensure the wellbeing of human by eliminating the risk of hunger. Besides being one of the largest contributors to Malaysian economy, food industry is also one of the primary sources of earnings for local community in Malaysia and is viewed as a critical aspect in the overall national economic development as they constitute fundamentally in phrases of profits distribution and employment generation in Malaysia (Rahman, Ahmad, Mohamad and Ismail, 2011). At present, the Malaysian food industry is contributing 10 percent of total manufacturing output and the manufactured products have been exported to more than 200 countries with annual export value of over RM 20 billion in 2017 (MIDA, 2018).

The Malaysian food industry has also grown tremendously over the years with the advancement in processing technology and innovation that is parallel with the global economic growth. The economy of the food industry has transformed to a very solid

and experienced speedy conversion in response to the intensifying competition and customer demand. The expansion of product range also contributes to the increase of investment in the food industry. For this reason, the food industry has been increasingly recognised as one of the sectors that could generate significant monetary advantage to Malaysia.

Apart from being one of the largest economic contributors to the nation, the food industry is also in charge for the safe food products produced for human consumption. The food industry players should keep up with the high safety standards set by the Ministry of Health, Malaysia. Apparently, the improvement in food safety aspect has not been up to the standards despite these economic changes. This is due to the fact that food poisoning ranks the fourth highest incidence rate of communicable disease in food and water-borne disease category, which is 55.21 per 100,000 populations in 2016 (Department of Statistics Malaysia). However, the number of cases reported in Malaysia in the last five years was only a handful of them, suggesting that there have been unreported cases. On top of that, the World Health Organization (WHO) revealed that an estimated of 600 million people throughout the world were affected by food poisoning. From this figure, a number of 420,000 people died due to food poisoning each year resulting in the loss of one third of United States' population each year (WHO, 2017).

The high incidence of food poisoning proves that the world populations' level of awareness on food consumed is relatively low. This is because the burden of foodborne illness between public health and to the economy has often been

underestimated due to underreporting and difficulties to establish a causal relationship between food contamination and resulting illness or death (WHO, 2017).

As a matter of fact, foodborne disease is avoidable if food is handled securely from the time it is acquired until the time it is served. The elevating cases of foodborne illness have made actors involved in the food system concerned, specifically about health and ethical issues such as the efficacy of the system in providing safe food and working conditions for food service operators (Mohd Nawi & Mohd Nasir, 2014). In this study, food service operators can be proactively involved in preventing foodborne illness by having a proper food safety plan and undergoing intensive food handling and preparation training in order to correctly follow the food safety plan in place. Therefore, it is expected that information on the guidelines of cleanliness and safe food handling practices of food premises helps various parties, precisely food service operators, while handling food. Besides, the capacity to maintain the development in the food sector is highly dependent on the effectiveness of the food safety programs that aims to protect consumers from health hazards. Therefore, it is crucial for food service operators to realize their shared responsibility in constantly preparing nutritious and safe food to consumers.

In conclusion, the risk of food poisoning should not be taken lightly because it may result in death. A huge effort to prevent such situation has been strengthened through the steady development of a food safety system that guides food industry players against food contamination caused by chemicals and microbes. Therefore, the Food Safety and Quality Division, the Ministry of Health Malaysia, has full authority to

control over the safety and quality of food in conjunction with Food Act 1983 and Food Hygiene Regulations 2009.

1.3 Problem Statement

Malaysia is not spared from food poisoning cases. A series of incidents related to food safety have taken place since 2006, mostly related to food poisoning in schools and food premises (Rajamanickam, Ganeson, & Ravindran, 2012). The Ministry of Health Malaysia has received a number of food poisoning cases reported for the last five years with an average of approximately 8,000 cases of food poisoning reported yearly (New et al., 2017; The Star, 2013).

Food poisoning incidence is a great concern in Malaysia due to the increasing cases recorded each year. For instance, a total of 2,325 food poisoning cases occurred in schools during the first quarter of 2016 involving students and school staffs (Berita Harian, 2016). Selangor came out as the state with the highest reported cases of food poisoning, followed by Kedah, Perak and Kelantan. Meanwhile, Perak recorded over 1,000 cases of food poisoning incidents in schools (Astro Awani, 2016). The statistics cited from New et al., (2017) in Figure 1.1 showed an increase in food poisoning cases in schools over the past year with 3,822 cases in 2010, 3,959 cases reported in 2011, 4,305 cases in 2012 and 5,017 cases in 2013, 5,265 cases in 2014, 8,000 cases in 2015, and 6,012 cases in 2016 (New et al., 2017).

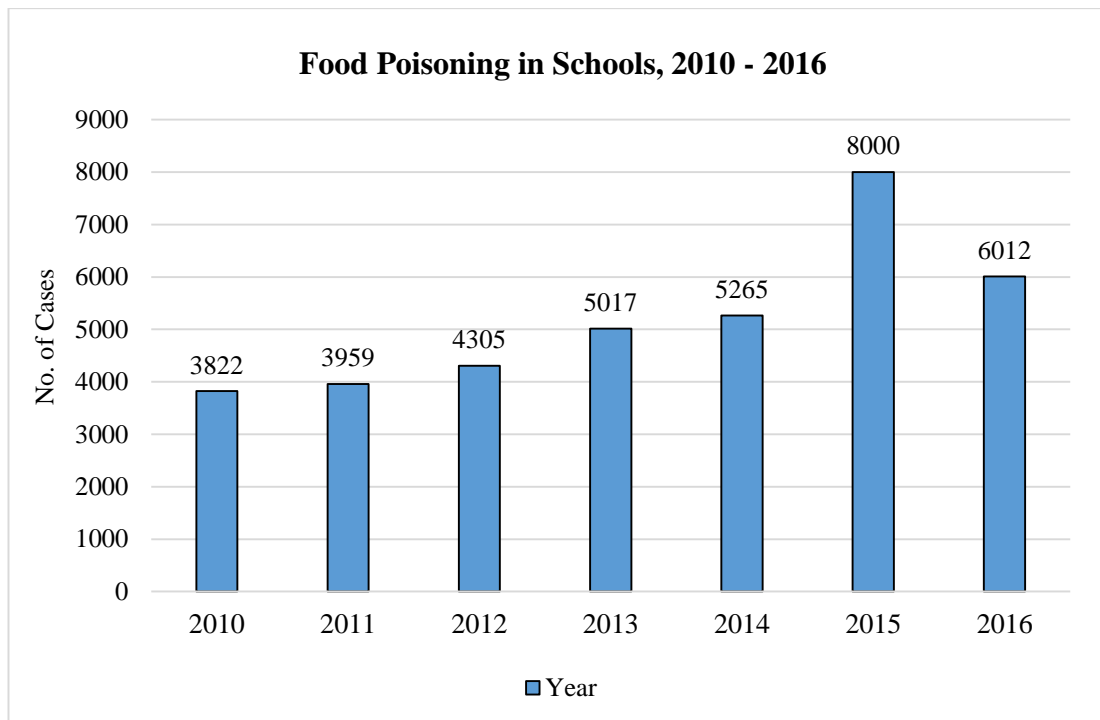


Figure 1.1: Statistics of Food Poisoning Cases Occurring in Schools, 2010 – 2016.
Source: New, Ubong, Premarathne, Thung, Lee, Chang, and Son, 2017.

Therefore, in order to address the alarming food poisoning cases in schools, a total of 30,314 inspections were carried out by the Ministry of Health Malaysia from 2015 until June 2016 including inspections of 24,280 schools and educational institutions' canteens as well as 6,034 boarding schools' canteens throughout Malaysia (Utusan, 2016). Through these examinations, a total of 261 closing orders were issued under Section 11 of Food Act 1983 and Food Hygiene Regulations 2009 since the food service operators failed to comply with the stated food safety regulations.

Nonetheless, foodborne illness remains a major public health concern because a huge number of people were affected due to these repeated foodborne outbreaks. Besides that, a great economic loss incurred annually as a result of the unresolved food safety episodes (Garayoa, Vitas, Diez-Leturia & Garcia-Jalon, 2011). The Malaysian government took these food safety incidents cases seriously. As a result, a new

regulatory framework for food safety has been upgraded in recent years for food service operators to comply with. The main objective of the new regulatory framework is to maintain nutritious and safe food for consumption.

Initially, the previous established regulated framework for food safety was primarily limited to observing the final prepared meals, instead of comprehensively emphasizing on the entire food preparation and handling processes; from the receiving of raw materials up to the dishes serving. Hence, for that reason, the Department of Food Safety and Quality, the Ministry of Health Malaysia, has come up with a new regulation as an alternative to cope with the increasing number of food poisoning cases over these years.

Launched in 2014, BeSS (Clean, Safe and Healthy) is a recognition given to food service operators to encourage the provision of safe and healthy food. It is an improvement program to the existing regulations conducted by the Ministry of Health Malaysia. This three (3) years valid recognition is awarded to food premises including food courts, restaurants, cafeterias, canteens, hawkers, caterers and food trucks that have managed to comply with the designated criteria. Such criteria include the ability to maintain the cleanliness of the premises, promote appropriate food portion sizes accordingly based on individual needs, and provide safe and healthy food options upon serving (Food Safety and Quality Division).

Even with BeSS system in place, food service operators still failed to comply with the stated regulations and this can be seen through the continuous increase of food poisoning cases yearly. Hence, this situation reflected that food service operators still

failed to comply with the required food safety standards and regulations which then leads to food poisoning cases, or perhaps because of the food safety module (BeSS) is relatively new. To the researcher's knowledge, no studies have been done to determine the effectiveness of the law concerned either in terms of its application, implementation, enforcement and the impact of Malaysian food safety standards on food service operators and how these standards affect food service operators' in food production processes at the premise thus far. Therefore, in order to better understand the core problem of this issue, the present study attempts to explore the main causes of frequent food safety incidents in Kedah by using the knowledge, attitudes and practices (KAP) model, on selected food service operators in regards to their food safety and hygiene practices while handling food and finally able to determine on the food safety standard compliance level of the food service operators.

1.4 Research Questions

Based on the issues discussed in the problem statement, this study seeks to address the following research questions:

- i. What has been the consequences of food poisoning incidence to the food business?
- ii. Who has the operational responsibility to ensure the food produced is safe for human consumption?
- iii. Why do the cases of food poisoning incidents keep increasing despite the establishment of Malaysian food safety standards?
- iv. Do the existing Malaysian food safety standards support/assist food service operators in conducting food preparation processes?
- v. To what extent do food service operators comply with food safety standards?

1.5 Research Objectives

Based on the background and problem statement of this research, the sub objectives of this study are as follows:

- i. To explore the impact of food poisoning incidence to the food business.
- ii. To explore the role of food service operators in ensuring the safety of food for human consumption.
- iii. To investigate the root cause of food poisoning incidents despite of the establishment of food safety standards.
- iv. To discover whether the existing food safety standards support/assist food service operators in conducting food preparation processes.
- v. To explore the level of food safety standards complied by food service operators.

1.6 Scope of the Study

The main objective of this study is to explore the main causes of frequent food safety incidents in Kedah by using the Knowledge, Attitudes and Practices (KAP) model, on selected food service operators in regards to their food safety knowledge, attitude towards food safety and practices while handling food, and finally able to determine on the food safety standard compliance level of the food service operators. Therefore, food service operators were chosen to further study the variability in the food safety knowledge, attitude and practices of food service operators in food services. The population of this study comprised food service operators in Malaysia and the sample comprised food service operators involved with food preparation. These operators were mainly from the food outlets located in Kedah. Food service operators were the target population in this research because they are the key players

in determining and controlling the best practices of food preparation and handling. While Kedah might not have the highest recorded statistics of food poisoning incidents in the past years, this state of the northern region was selected as the setting of this study due to the worst reported fatal food poisoning incident in 2013 which resulted in death. Due to this incidence, Kedah have been recorded as the states with the highest fatality rate in 2013.

1.7 Significance of the Research

The purpose of conducting a study on this area is to explore the main causes of frequent food safety incidents in Kedah based on KAP (Knowledge, Attitude and Practices) model. Accordingly, this is an exploratory study which is thoroughly based on literature review elaborated in Chapter 2. The study is expected to provide a solid platform for more comprehensive future research.

Precisely, the expected prime contribution of the study is to enhance the understanding of key actor of food service operators in regards of safe food handling by coordinating the findings from past studies. It is in the interest of the researcher to investigate good attitude practices among food service operators in selected foodborne episodes cases in Kedah. Therefore, it is hoped that the findings of the study are able to benefit academicians, food manufacturers, food service operators as well as the Malaysian government in generating valuable new insights that reveal new ways to improve food safety, and food safety practices among food service operators. From the improved food safety practices among food service operators, it is also hoped that food businesses will reap more benefit, enhance the existing food

safety practices and consumers' trust, and eventually produce better healthy food for consumers.

Practically, the study is expected to bridge the gap between practitioners and the policy makers. It is vital for individuals to realize how their conduct and activities commit to the safety of food and how they can minimize the risk of foodborne illness. From farm to fork processes, human exercises assume an essential part in food safety as consumers consistently look for safe, best quality and nutritious food products (Khan, Chamhuri & Farah, 2015).

1.8 Definition of Key Terms

Terms are defined based on the use of the given terms. The important terms that often appear in the present study are defined as follows:

1.8.1 Food Safety

The term "safe food" has diverse meanings depending on the target audiences. For instance, consumers, special interest groups, law makers, industries, and academia will have their own unique descriptions based on the positions and perspectives. However, much of the food safety information received by the public comes from the media. Consequently, the media's point of view might influence the interpretation of the public perception in regards to food safety (Seward, Schmidt & Rodrick, 2003).

Safe food can be described as food that has been handled appropriately in each stage of food preparation processes from the time it is received, until the time it is served; including thoroughly washing the fish and poultry that will be cooked (Ababio and

Adi, 2012), food prepared on clean and sanitized surfaces (Seward, Schmidt and Rodrick, 2003), and with sterilized utensils and free from hazardous substance (Ababio and Adi, 2012). Safe food is also defined as food that is free from contamination (FOA, 2003), safe to eat upon consumption (WHO, 2014), within its shelf life, stored and distributed under appropriate temperature control (Food Safety and Standards Act, 2006) as well as food that maintains its nutrients without any damages neither through its look nor smell (Seward, Schmidt & Rodrick, 2003). By referring to Henson and Traill (1993), food is considered safe when there is a possibility of not suffering from consumption of a specific food. In other words, food safety is best explained as the scientific disciplines describing the handling, preparation, and storage of food in order to prevent foodborne illness (Mohd Nawi & Mohd Nasir, 2014).

1.8.2 Foodborne Poisoning

The definition of food poisoning, as approved by the World Health Organization, is any diseases or an infection resulting from the consumption of contaminated food, pathogenic bacteria, viruses, or parasites either through food or water (WHO, 2014). Foodborne poisoning can be detected through the initial symptoms such as vomiting and diarrhoea (Boddie & Kun, 2014). These symptoms normally appear within a few hours or a few days upon consumption of food containing pathogenic micro-organisms.

1.8.3 Food Safety Standards

Food safety standards help those who are involved in food safety measures in food businesses to establish good manufacturing and handling processes. These safety

standards ensure that the produced food is in compliance with food safety legislation and meets the quality level expected by both food service operators and consumers.

1.8.4 Food Product Safety Management

Food product safety management is a scientific discipline describing handling, preparation, and storage of food procedure that helps minimize the risk of foodborne illness (Boddie & Kun, 2014). It is the adoption of Good Manufacturing Practices (GMP), Good Hygienic Practices (GHPs), Hazard Analysis and Critical Control Point (HACCP) and such other practices as determined by regulation for the food business (Food Safety and Standards Act, 2006). One of the means of providing assurance that the certified organization has implemented and followed a system in regards to food safety management in terms of its practices, activities, products and services which in line with the organization's food safety policy and the requirements set by ISO 22000 is through the certification of Food Product Safety Management System of an organization (Food Safety and Standards Act, 2006).

1.8.4.1 Good Manufacturing Practice (GMP)

By referring to Ahmed (2009), Good Manufacturing Practices (GMP) is a system to assure the products are consistently produced and controlled according to the standard set. GMP is specifically designed to minimize the risk involved in production process that cannot be controlled by the final product testing. Besides that, GMP also controls the food quality, diagnostics, ingredients in drugs and food, pharmaceutical products and devices used in medicine (Ahmed, 2009). Thus, GMP makes sure that a company follows a set of rules and regulations that meets all the

necessary quality requirements so that the final products produced are clean and safe; without posing any risks to the public.

1.8.4.2 Good Hygiene Practices (GHPs)

Food safety measures and quality responsibilities of a food business can be achieved by the implementation of quality assurance system along with the production chain which includes Good Hygiene Practices (GHPs). This system is a set of requirements to prevent contamination of food to provide safe, hygienically prepared and good quality food. This is because majority of food safety incidents occurred were a result of contamination caused by improper practices such as poor storage, poor personal hygiene, unsafe source of food, lack of environmental hygiene, poor sanitation practice, inappropriate storage, and the list goes on. Thus, it is crucial to identify activities and take necessary steps to ensure food safety and food safety procedures are identified, implemented, maintained and reviewed periodically.

1.8.4.3 Hazard Analysis and Critical Control Point (HACCP)

Hazard Analysis and Critical Control Point (HACCP) is a scientific and systematic approach that comprises seven principles with the objective to identify, access, prevent and control of hazards in the food production process (Djordjevic, Cockalo, & Bogetic, 2011). HACCP system is crucial for production of safe food products (Wallace, Holyoak, Powell and Dykes, 2014; Wallace and Williams, 2001) which mainly focused on the prevention strategies on known hazards and the occurring risk at specific points in the food chain; from the primary sector up to the final consuming of the product (Fai Pun & Bhairo-Beekhoo, 2008). This is an international approach that is essential to ensure the safety and suitability of food for human consumption.

1.8.4.4 Ministry of Health Malaysia (MOH)

The Ministry of Health (MOH) is a ministry of the Government of Malaysia that is responsible for health system; health behaviour, cancer, public health, health management, medical research, health systems research, respiratory medicine, health promotion, healthcare tourism, medical device, blood collection, leprosy control, clinical research, health care, dental care, health institution, laboratory, pharmaceutical and patient safety (Ministry of Health Malaysia).

1.8.4.5 Food Act 1983 and Food Hygiene Regulations 2009

Malaysian Food Act 1983 and Food Hygiene Regulations 2009 was enforced concurrently by the Ministry of Health Malaysia with the aim to protect the public against health hazards and fraud in the preparation, consumption, product labelling and selling of food. This act comprises guidelines governing food safety in terms of quality and food hygiene (Ministry of Health Malaysia). Food Hygiene Regulations 2009 also provides an infrastructure to control the hygiene and safety of food sold in the country with the aim to protect public health (Ministry of Health Malaysia).

1.8.4.6 Makanan Selamat Tanggungjawab Industri (MeSTI)

Makanan Selamat Tanggungjawab Industri (MeSTI), or the "Food Safety is the Responsibility of the Industry" in English, is a food safety programme undertaken by the Ministry of Health. The objective of MeSTI is to put in place a system for the maintenance of food hygiene and food process control which includes food safety assurance and food traceability. Thus, MeSTI compliance will serve as a platform for Small and Medium Enterprises (SMEs) in Malaysia to be a major producer and

exporter of food products by facilitating food safety and quality compliance (Ministry of Health Malaysia).

1.8.4.7 Bersih, Selamat dan Sihat (BeSS)

Bersih, Selamat dan Sihat (BeSS) is a recognition awarded to food service operators' premises to encourage the provision of safe and healthy food. It is also one of Malaysian government's initiatives to maintain food safety among food service operators (Ministry of Health Malaysia).

1.8.5 Food Service Operators

Food service operators are those who engage directly and indirectly in the preparation or production of food, touch foods or in contact with food surfaces, handle packaged and non-packaged foods or appliances at any point in the food premises (Ministry of Health Malaysia).

1.9 Organization of the Thesis

The present study consists of five chapters, namely introduction, literature review, research methodology, result and findings, discussion and conclusion. A summary of each chapter is as follows:

Chapter 1 provides a brief introduction, background and the research problem. It then outlines the research questions with research objectives, significance of the study, scope of the study and the contribution to body of knowledge. The chapter then ends with the organization of the study.

Chapter 2 briefly discusses the food safety measures in Malaysia. The chapter also reviews previous literature on variables used in the structural model in regards to food safety. The knowledge, attitude and practice of food service operators towards food safety are also discussed in this chapter.

Chapter 3 presents the research methodology used in the present study consisting of research design, study sample and population, sampling and data collection technique, and also the measurements used to analyse the data. Besides, Chapter 3 also discusses the reasoning behind the adopted research methods. The justification of the selected research methodology, the research paradigm, and the case study method are offered in this chapter. The case study research design and issues that are related to the selection of the cases and unit of analysis are also discussed. The data collection methods, modes of analysing and interpreting the data, a diagram of the research activities, and the criteria for assessing the quality of the case study research design in terms of reliability and validity are also described and discussed at the end of the chapter.

Chapter 4 focuses on the analysis and results or findings of the study, including the response rate, participants' profile, and relevant measures to explain the findings.

Chapter 5 is the last chapter of the thesis. This chapter presents the discussions and conclusion of the study. It discusses the major findings of the study and then elaborates on the research limitations and future research suggestions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Chapter Overview

This chapter begins with an extensive literature review pertaining to the research conducted. It covers the Malaysian food safety landscape, intervention strategies, as well as reviews on food poisoning episodes that occurred locally and internationally. Followed by an underpinning theory adapted for the present study. Next, the research conceptual framework was then developed by stages starting with preliminary, improved and finalized conceptual framework (pre-testing). Concluding this chapter, the theoretical framework of the present study is presented.

2.2 Background of Study

Food is a basic necessity for humans to survive. Perfect nutrition is essentials for ensuring the mental and physical health of the human being. By practicing a clean and healthy eating lifestyle enables mankind to carry out their daily routines more productively. Owing to the fact that the foundation for various chronic diseases such as cancer, diabetes, heart failure, and kidney disease often caused by improper meal selection besides practicing an unbalanced diet. Therefore, the food needed by the human body must be clean and safe to consume.

Food safety according to Seaman (2010), is food that is clean, in good condition and is served in an appropriate meal portion as well as free from impurities such as bacteria and other faeces and waste. The scholars also stressed out the importance of having safe food whereby unhygienic food may contain harmful bacteria that

contributes to cases of foodborne illness. For instance, typhoid, food poisoning, and jaundice. Therefore, keeping food safe helps in preventing food-related diseases.

There are a few basic things that should be prioritized in maintaining the cleanliness of food produced by food manufacturers. For instance, the quality of raw materials used, hygienic food handling practices, hygiene food service operators, and adequate basic health needs. Other than that, having a clean environment at food premises where the food is produced, using appropriate cooking utensils, proper food preparation techniques and correct storage systems should also be emphasized.

However, as stressed out by Ababio and Adi (2012), food consumed now is no longer safe for human consumption despite the importance of food to mankind's survival. This statement has also been supported by a report from the World Health Organization (WHO) who identifies foodborne outbreaks is a major worldwide public health threat in the 21st century (WHO, 2014). Besides that, the WHO has also estimated that approximately 30% of people in industrialized countries suffered from foodborne illnesses each year (WHO, 2014). This can be seen from a series of recorded and compiled documentation of foodborne disease on each continent in the past decades, and the results prove that the cases of foodborne illness are increasing significantly.

As mentioned by WHO earlier, food safety is now a global concern whereby both developed and developing countries were also affected by food safety threats. This is in agreement with another study done by Akhtar, Sarker, and Hossain (2014), mentioning that foodborne illness is no exception for developing countries as well.

For instance, 9.4 million food safety incidents reported in the United States with 55,961 hospitalized. Out of this amount, a total of approximately 1,351 innocent lives affected each year due to consuming contaminated food products. On top of these huge figures, there were more underreported cases where thousands of untreated people may suffer from foodborne illness symptoms such as nausea, diarrhoea, vomiting and stomach ache (Pires et al., 2015). Much worsen cases may also involve the human nervous system which may lead to deaths. This is because not all food poisoning victims seek proper treatment at the hospital. Therefore, accurate data on the number of people affected in each food poisoning episode should be recorded accurately to further improve the effectiveness of food safety measures accordingly (Haagsma et al., 2013). Besides human concerned, Low et al., (2016) expressed a concern that food safety issues may also interrupt the economics of one's nation enormously.

In the local setting, Malaysia is not spared from these food safety incidents. With the rapid development of the Malaysian economy, profits and efficiency are turning into a noteworthy objective of the food enterprise development which has indirectly contributed to major food safety hazards (Liu, Zhang & Li, 2014). Regardless of the increment in the Malaysian food industry, food safety incidents have become increasingly serious in recent years. The impact of food poisoning is massive such as severely damaged one's daily routine, having negative consequences on the development of the food industry as well as the whole Malaysian economy (Liu et al., 2018).

Table 2.1 revealed the four dominant communicable diseases and incidence rates in Malaysia for the years 2016 and 2017. As stated in the table, dengue fever remained the highest communicable diseases for the year 2016 and 2017 with 100,722 and 83,443 cases respectively despite showing a decrease in the number of cases compared to the previous year. Meanwhile, food poisoning recorded as the fourth-highest communicable disease for two consecutive years which is 17,480 cases in 2016 and 13,686 cases in 2017. Even though there has been a slight decrease in the number of foodborne illness' cases reported in 2017, yet food poisoning still dominates the top four highest communicable diseases for two consecutive years. This figure is somehow worrisome thus proves that food poisoning issues should not be taken lightly as it may result in death.

Table 2.1: Top Four Communicable Diseases and Incidence Rate in Malaysia, 2016 and 2017

Communicable Disease	Number		Rate	
	2016	2017	2016	2017
Dengue Fever	100,722	83,443	318.13	257.6
Hand, Food and Mouth Disease	47,008	29,359	148.47	90.64
Tuberculosis	25,739	26,168	81.3	80.78
Food Poisoning	17,480	13,686	55.21	42.25

Incidence per rate 100,000 population

Source: Department of Statistics Malaysia, Official Portal.

In this research, a total of approximately 40,000 food safety incidents occurring from 2011 to 2017 were taken as the research object and from the incidents, an in-depth analysis was done from areas of food category, the main responsibility, and the possible causes, with the specific end goals to propose some improvement strategies in every link. This situation represents a global sense of urgency in one's nation to develop and execute actionable strategies and strictly address unsafe food products

and foodborne diseases, as food safety is definitely a global concern. It is an undeniable fact that millions of human life are at risk due the unsafe food consumption that often leads to deaths (Liu et al., 2014). Therefore, a strong food product safety management system needs to be well executed in most countries to ensure a safe global food chain.

2.3 Global Food Safety Initiatives (GFSI)

In a global context, with a vision of “Safe Food Everywhere”, the Global Food Safety Initiatives (GFSI) gathers all food industry players to collaborate in improving food safety management systems around the world (Fuchs, Kalfagianni & Havinga, 2011). GFSI was first initiated by food industry leaders in the year 2000 with the major aspiration to find collaborative solutions to solve food safety risks in a global context. Food safety experts in various field such as retail, manufacturing, food service companies, academia, service providers, international organizations as well as the government were the leaders in the GFSI community (Fulponi, 2006).

Today, GFSI is recognized as the global food safety benchmark (Crandall et al., 2012). Through actionable GFSI standards implementation at food premises, majority of food safety professionals have given positive feedback prior to the enhancement of food safety practices at food premises, the ability to produce more safe food products and increasing food service operators’ knowledge on safe food practices in the kitchen. On top of that, GFSI also assisting the food service operators in preparing the forthcoming regulatory changes. Therefore, a comprehensive and well-executed food product safety management system is in dire need to maintain safe food products for consumption, thus lowering the risk of foodborne illness.

2.4 Malaysian Food Safety Landscape

Governments of many countries have established new institutions, standards, and methods for regulation of food safety and also to increase investment in the control of potential hazards (Djukic, et al., 2016), so does our beloved nation - Malaysia. Food safety in Malaysia is governed by the Food Safety and Quality Division, the Ministry of Health Malaysia under Food Act 1983, Food Regulation 1985 and Food Hygiene Regulations 2009 (Siow & Sani, 2011). All of these standards complement each food category to ensure better product quality produced and thus added value to the end products. However, amongst all of these standards, Food Act 1983 is the main mother act in Malaysia which regulates all food-related matters especially concerning public health.

On the other hand, Food Hygiene Regulations 2009 is an act established under the Food Act 1983. It was gazetted on 28th February 2009. Initially, Food Hygiene Regulations 2009 has been enacted ever since 1983 based on several guidelines such as Food Hygiene Code 1974 and Food Hygiene Codex Principal 1974. In general, Food Hygiene Regulations 2009 were constructed to provide an infrastructure that can control the cleanliness of food premises and food safety-related measures to protect the public against health hazards. Specifically, the regulations were initiated to maintain the cleanliness both of the food premises and food service operators. It highlights the food service operators' hygiene practices, handling activities that may contaminate food, and the use of appropriate equipment during food preparation. Food Hygiene Regulations 2009 also focused on standardizing food hygiene enforcement activities at food premises and food safety assurance programs such as HACCP, GHP, and GMP.

The Food Safety and Quality Division of the Ministry of Health Malaysia was given full authority by the government to bear the responsibility involving food safety in the country. This includes monitoring the production of food products according to the concept of “farm-to-table”. This is a framework utilized by the unit to conduct activities that protect consumers from food-related hazards. On top of that, the Food Safety and Quality Division also hold the responsibility to develop strong, and quality food products produced by food industry players to be as competitive as food industry players at the international level (Ministry of Health Malaysia).

Apart from that, the Food Safety and Quality Division have also been conducting various food safety programs such as health educations, promotions, and campaigns throughout Malaysia. This is in conjunction with the national food safety initiatives to improve and promote food safety awareness among Malaysians. In essence, the division gave high priority on law enforcement at first, however this division switched its direction recently by focusing more on educational and promotion activity approach since this is the best initiative to seek the people and food industry players’ attention and cooperation on the national food safety agenda ultimately (Fernando, Ng, & Walters, 2015).

Previous scholars Pang and Toh (2008), have identified that both Food Act 1983 and Food Regulation 1985 standards procedures and guidelines are inadequate to be obeyed in detail by food industry players. Current practices seen in food production have complied with the rules set, except for the hygienic parts. This is because both standards mostly concerned with complying with each food category. Both scholars have also identified the fact that food service operators having a relatively low

knowledge of food processing and preparation techniques. Therefore, Food Hygiene Regulations 2009 was established as a platform to monitor the hygiene level at food premises, focusing on food service operators and means to avoid practices that can contaminate food products.

On the other hand, BeSS (Bersih, Selamat dan Sihat), is a recognition awarded to food premises in promoting the provision of safe and healthy foods to consume. It is an improvement from the current monitoring food safety management programs by the Ministry of Health Malaysia (Food Safety and Quality Division). BeSS recognition will be given to food premises who practices four criteria that include the ability to keep the premises clean and able to provide safe and healthy food in an appropriate portion size according to individual needs. Food-related businesses such as food premises, food stalls, cafeterias, canteens, hawkers, catering and food trucks were eligible for BeSS recognition (Food Safety and Quality Division).



Figure 2.1: BeSS Recognition Logo

Source: Food Safety and Quality Division, Ministry of Health Malaysia.

This recognition involves two components which are food safety and quality and nutritional components. Food premises owners were encouraged to apply for BeSS recognition as it is not subjected to any charges. The recognition will be given freely to food premises that have fulfilled the four main criteria successfully and the recognition is valid for 3 years. Food premises' owners can also apply for renewal of the recognition once it has expired.

By referring to Table 2.2, the number of food premises granted with BeSS recognition is increasing each year with 558 recognition in 2015, 664 recognition in 2016 and 1,693 recognition in 2017. In total, the number of BeSS recognition issued by the Ministry of Health Malaysia from 2013 to 2017 is 3,112 (Food Safety and Quality Division). The increasing number of BeSS recognition achieved from 2013 to 2017 proved that food premises' recognition is equally important as it assures the quality of foods prepared to consumers (Food Safety and Quality Division).

However, the number of food premises certified with Grade A and BeSS recognition is far less if compared to the total registered food premises in the year 2017 which is 21,480 food outlets in Malaysia. Therefore, food premises' owners should improve the level of premises' cleanliness as well as food service operators' hygiene practices in food production processes so that consumers will have higher confidence in foods offered thus protect the public against health-related hazards.

Table 2.2: BeSS Recognition in Malaysia, 2015 – 2017

	2015	2016	2017
Perlis	16	18	47
Kedah	50	60	115
Pulau Pinang	55	49	124
Perak	53	37	129
Selangor	60	51	236
Negeri Sembilan	38	27	113
Melaka	27	28	75
Johor	34	61	112
Pahang	50	95	136
Terengganu	29	27	86
Kelantan	30	33	102
Kuala Lumpur & Putrajaya	25	36	134
Sabah	45	77	120
Sarawak	37	45	123
Labuan	9	20	41
Total	558	664	1693

Source: Food Safety and Quality Division, Ministry of Health Malaysia.

2.5 Intervention Strategies

A series of intervention strategies have been set up by the government concurrently with the main objectives to reduce the number of food poisoning cases in Malaysia, which is now at an alarming level. This includes outbreaks surveillance and monitoring program, training and education as prevention control, and enhancing the current food product safety management system. Other than that, introducing a food premise grading system, encouraging food premise registration as well as the enforcement of food premises inspection and closure were executed promptly. All of the above-mentioned food safety intervention strategies proved that the government

took food poisoning cases seriously and continuously committed to fight against the risk of food-related hazards.

2.5.1 Outbreak Surveillance and Monitoring

In response to the never-ending food poisoning chain in Malaysia, foodborne outbreak surveillance and monitoring system were established with the objectives to access and confirm the severity and impact of the disease, trends and thus proposed control interventions (Salleh et al., 2017). However, it is still a norm that many such outbreaks go unreported or not investigated. As for Malaysia, the outbreak of foodborne disease still occurs in a certain high-risk area where it needs to be properly managed (Ezat, Netty & Sangaran, 2013). As stressed out by Soon, Singh and Baines (2011), it is a major obstacle in outbreak investigation when in almost all cases, the contaminated food could not be traced, or if there are any reported cases, it may be only at the tip of an iceberg, but eventually, the extent of the issue is however unknown, as foodborne incident cases often go undetected or underreported.

In regards to the outbreak and surveillance monitoring in Malaysia, National Food Safety and Nutrition Council has been introduced in March 2001. It is the nation's highest advisory body which deals in all food safety and nutrition-related matter. Besides that, this advisory body also serves to reinforce the efforts between all agencies involved in food safety and nutrition and optimizing available resources from both the public and private sectors in enhancing an integrated approach between them.

Another surveillance system in the country includes Malaysian Foodborne Diseases Network (MyFoodNet). It was initiated to monitor and coordinate the surveillance system of foodborne diseases. Besides that, the Food Safety Information System of Malaysia (FoSIM) introduced in 2003. This intelligent web-based information system was designated to assist in maintaining imported foods sold in Malaysia always in good condition and safe for mankind's consumption. Through the system, all entry points, food monitoring laboratories, and health departments were connected and information transfer between these agencies will be more effective and convenience (Salleh et al., 2017).

Based on the above-mentioned strategies, the establishment of the outbreak surveillance and monitoring systems able to cater food-related hazards in the nation and strengthen its collaboration and networking between units and departments to improve the current food safety practices, thus proves that Malaysian government committed in ensuring better food consumption to the people.

2.5.2 Training and Education as Prevention Control

Rajamanickam, Ganeson, and Ravindran (2012) in their research disclose that most of the food-related illnesses occurred in Malaysia since 2006 involving schools, canteens and food premises. The emergence of foodborne poisoning is various, such as poor handling practices by food service operators, improper cooking techniques, pesticide residues and lack of food safety awareness. However, the scholars stressed out that poor handling practices and unhygienic food service operators were found to be the major causes of the attribution of food poisoning cases in Malaysia.

In other studies by Tan et al., (2013), the scholars also agreed that foodborne pathogens can be transmitted through the hands of food service operators that in contact with raw and ready-to-eat food during the entire food production chain. In accordance with Soon et al., (2011), food service operators hold the greatest responsibility to minimize cross-contamination during food preparation especially when dealing with raw and ready-to-eat foods. Both Tan et al., (2013) and Soon et al., (2011) agrees that food service operators' training is an absolute must to enhance safe food handling practices during daily business operation. Therefore, the Malaysian government has made a drastic move as an alternative to curtail these never-ending episodes by emphasizing food service operators' training, and surveillance system.

To enhance food safety training among food service operators, the Ministry of Health Malaysia has introduced the Food Handlers Training Program (SLPM). The main agenda of the training is to give exposure and awareness to all food service operators in Malaysia of the need to produce high-quality foods which emphasized on hygiene and food safety aspects. The program was hoped to capture the attention of food service operators because the training covers the syllabus on food cleanliness, food safety, and critical factors that contribute to food poisoning. Therefore, the government has made the training mandatory for all food service operators following the Food Act 1983. By referring to the act, any food service operators who failed to comply with the rules shall be fine not more than RM 10,000 or two years of imprisonment. This program was conducted by Food Handlers Training School recognized by the Ministry of Health Malaysia to balance the workload from the government. Besides that, the program will be carried out more systematically if

handled by a third party institution. Nevertheless, accreditation, monitoring activities, module syllabus, the appointment of instructors and certification falls under the authority of the Food Safety and Quality Division, Ministry of Health Malaysia.

By referring to Table 2.3, there were a total of 317 accredited food handlers' training schools recorded as of March 2019 (Food Safety and Quality Division). From the table, Selangor came out as a state having the most training schools recognized in Malaysia with 108 institutes followed by Johor and Kuala Lumpur with a total of 29 and 28 training schools respectively. On the other hand, Kelantan, Perlis, and Labuan having the least number of food handlers training schools with 6, 5 and 1 institutes respectively. It is hoped that the number of training schools will increase every year so that more food service operators will be given exposure and experience a proper food handling training in producing quality food that is free from contamination.

The previous study by Siau et al., (2015) revealed that there was a positive relationship between education knowledge and food service operators' attitude. This means that training and education programs attended help in assisting food service operators to increase their knowledge in safe food handling practices in terms of sanitary management and thus improved their attitude towards food preparation in the premise. Hence, the risk of cross-contamination could be minimized to the lowest possible.

Table 2.3: Food Handlers Training Schools (SLPM) Recognized by Ministry of Health Malaysia as of March 2019

State	No. of Food Handlers Training Schools
Perlis	5
Kedah	11
Pulau Pinang	15
Perak	22
Selangor	108
Negeri Sembilan	14
Melaka	12
Johor	29
Pahang	16
Terengganu	12
Kelantan	6
Kuala Lumpur & Putrajaya	28
Sabah	18
Sarawak	20
Labuan	1
Total	317

Source: Food Safety and Quality Division, Ministry of Health Malaysia.

Meanwhile, the data presented in Table 2.4 revealed the total number of food service operators that have been trained in Malaysia for the years 2014 and 2015. There were 798,005 trained food service operators recorded in 2014. However, the number of trained food service operators trained in 2015 showed a decline to 463,790. From the table, it was revealed that Selangor has the highest food service operators trained for both years with 144,714 trained food service operators recorded in the year 2014, and the number of food service operators trained in 2015 increases to 303,963. This figure is significant with the most number of food handlers' training schools registered in Selangor (Refer Table 2.3) because Selangor has the highest population

percentage in Malaysia with 6.38 million population in 2017 (Department of Statistics Malaysia, 2017). Therefore Selangor came out with the most number of food handlers institute registered and highest trained food service operators in both years.

Table 2.4: Food Service Operators Trained in Malaysia, 2014 and 2015

State	2014	2015
Perlis	14,405	4,597
Kedah	64,636	18,304
Pulau Pinang	66,515	17,264
Perak	66,597	13,918
Selangor	144,714	303,963
Negeri Sembilan	29,380	6,034
Melaka	21,444	6,912
Johor	91,136	19,538
Pahang	76,237	12,954
Terengganu	17,861	7,598
Kelantan	46,006	9,098
Kuala Lumpur & Putrajaya	72,016	17,566
Sabah	45,926	13,915
Sarawak	41,132	12,023
Labuan	0	106
Total	798,005	463,790

Source: Food Safety and Quality Division, Ministry of Health Malaysia.

However, regardless of the most number of food handlers training institute registered, and the highest trained food service operators recorded in 2015, Selangor was also the state with the highest number of food poisoning cases recorded in 2016 (Berita Harian, 2016). This situation was corresponded with research by Soon et al., 2011. The scholars elaborated on the laybacks in the training held. For instance, the

training provided to food service operators does not guarantee that the operators apply the hygiene and safety practices during food handling. This is because the knowledge gained during the training is not fully applied by the food service operators (Soon, et al., 2011). Other studies by Park, Kwak, and Chang (2010), have also revealed that most of the programs provided to food service operators are fully dependent on information sharing, but nothing on knowledge transfer. The shared information gained during training was expected to give huge difference to food service operators' safe routine practices, however the truth is only little changes seen among them.

Besides, the training programs held were not a great success by looking at the cases of foodborne illness reported which is increasing every year despite training and knowledgeable food service operators on safe food handling. This fact was supported by Angelillo, Viggiani, Rizzo and Bianco (2000), who reviewed that the knowledge gained through training and education programs was not necessarily practiced by the food service operators in providing clean and safe food. In addition to this matter, management support is an important element to look into to sustain the effectiveness of training and education programs. Previous research was done by Soon, Singh and Baines, (2011), and Seaman and Eves (2010), agreed that management and peer support plays a crucial role in motivating staffs both in attending the programs and apply the knowledge gained throughout the training program.

2.5.3 Food Premises' Grading Systems

Another intervention strategy drawn up by the authorities to curtail the increasing number of food poisoning cases involving food premises is through the food

premises grading system. Food premises' grading system is a systematic approach that recognized food premises owners who have met food safety requirements in providing clean, safe and quality foods and services to the consumers which are in line with Food Act 1983 and Food Hygiene Regulations 2009 (Seberang Perai City Council). The food premises' grading system is a useful education tool in providing guidelines to the public in recognizing a clean dining place with displayed grades on the premises before dine-in (Djekic et al., 2014). This system also helps in promoting a healthy culture amongst food entrepreneurs to better upgrade the level of sanitization, food safety and quality of food produced at the premises to the eyes of the public.

In Malaysia, food premises were graded based on the premises' level of cleanliness. The food premise inspection and evaluation were certified by the Food Safety and Quality Division, Ministry of Health Malaysia. The scoring system has been developed to evaluate food premises' level of cleanliness, food quality and safety of food produced at the premises upon inspections (Seberang Perai City Council). The evaluation includes the location of the premise, pest and temperature control, food storage and drainage system, toilet facilities, waste disposal, water supply, food service operators' level of sanitation, food handling practices, ventilation system, and the use of appropriate equipment. The inspection will be carried out once a year, and the grading changes depends on the food premises' current sanitary condition upon inspection.

At the end of the evaluation, the health officer will issue a copy of an inspection report to the food premises' owners indicating the score obtained and corrective

measures if necessary. Food premises' level of cleanliness will be evaluated and graded accordingly as indicated in Table 2.5.

Table 2.5: Food Premise Grading Criteria

Grade	Range	Indicator	Corrective Actions
A	86% – 100%	Very clean	Re-inspection will be conducted after 2 years or earlier if there is a food safety complaint.
B	71% – 85%	Clean	Re-inspection will be conducted after a year or earlier if there is a food safety complaint.
C	51% – 70%	Moderately Clean	Re-inspection will be conducted after 6 months or earlier if there is a food safety complaint.
D / No Grade	50 % and below	Dirty / Not Hygiene	All food service operators are required to re-attend food handling courses. Re-inspection will be conducted after 14 days. Food premise closure will be subjected if the ratings are 50% and below.

Source: Seberang Perai City Council.

By referring to the above Table 2.5, the information suggests that food premises who scored between 86% - 100% will be certified as Grade A premise. Premises with Grade A grading will be re-inspected after 2 years or earlier if there is any food safety complaint filed. On the other hand, a Grade B premise will be given to premises who scored between 71% - 85% upon inspection. Corrective action for a Grade B premise is a re-inspections after a year or earlier if there is any food safety

concern. Grade C will be given to food premises who scored moderately low during inspection whereas Grade D will be given to food premises with the scores of 50% and below. A re-inspection will be carried out after 6 months or earlier if there is a food safety complaint about premises with Grade C. In contrast, food service operators with Grade D scoring are required to re-attend food handling courses. On top of that, a re-inspection will be conducted after 14 days to check whether there are some changes made to improve its poor sanitary management, and the failure to obtain a 50% score and above may result in food premise closure. The grading systems are beneficial to describe the hygiene status of premises, thus reducing the risk of foodborne illness.



Figure 2.2: Examples of Food Premise Grading Certificate
Source: Seberang Perai City Council.

Figure 2.2 portrayed the examples of food premises' grading certificate given by a health officer upon evaluation. Food premises' owners are responsible to display the recognized certificate prominently on the premise. This certificate will facilitate consumers in choosing the food premises based on their hygiene criteria. Besides, the

consumer will also be able to judge whether or not the premise has complied in terms of food safety regulations by referring to the premises' certification.

However, the food premises' grading certificate may be withdrawn at any time if the food premises' owners were found to violate stated food safety regulations. For instance, the occurrence of food poisoning episodes, failure in maintaining hygiene practices during daily business operation hours, food service operators did not undergo medical check-ups including typhoid injections and failure in attending food handling courses for newly hired food service operators. Besides that, the withdrawal of food premises' grading certificate may also be because poor sanitation performances shown at the food premises that could pose hazard risk to the public. Therefore, food service operators play a very crucial role to maintain the premise at the highest level possible and continuously upgrading the quality food produced to avoid any food safety issues (Ministry of Housing and Local Government, 2014).

2.5.4 Food Premises Registration

Apart from the food handlers training program and food premises' grading system, food premises registration is one of the intervention strategies undertaken by the Food Safety and Quality Division, Ministry of Health Malaysia. Food premise inspection is a routine activity to maintain the level of cleanliness at food premises. These inspections were carried out to ensure whether or not the food premises maintain its level of cleanliness during daily business operation hours. The registration of premises is fundamental as underlined in Food Hygiene Regulations 2009 which requires all food premises who run business in Malaysia to register their premises with the Ministry of Health Malaysia. The failure to register a food premise

is an offense under Food Regulations 2009 and food premises' owners are liable to be fined not exceeding RM 10,000 or not more than 2 years imprisonment (Food Safety and Quality Division).

Through the food premise registration promotional activities carried out by the Food Safety and Quality Division, Ministry of Health Malaysia, a total of 149,487 food premises have been registered as of April 2018 (Refer Table 2.6). The total amount comprised of food premises involved in catering businesses, food trucks, cafeterias, canteens, food courts, and fast-food restaurants. However, despite the promotional campaign made, there are still many food owners failed to register their premises accordingly. For example street hawkers and roadside stalls. Not to mention, illegal food premises run by foreign workers.

Based on Table 2.6, Selangor recorded as a state with the highest number of registered food premises with 27,809 followed by Johor with 21,284 registered food premises. The existence of many food outlets in Selangor and Johor is to meet the demands of the crowded population in both states which has to influence them to have meals outside as it is convenient and fast rather than having home-cooked meals (Bhat, Reddy & Mandanna, 2018). The increase in registered food premises from year 2015 also proved that the food industry has evolved rapidly and benefited individuals as well as the country in terms of monetary values (Rahman et al., 2011).

Table 2.6: Number of Registered Food Premises in Malaysia, 2015 – 2018

	No. of Registered Food Premises	2015	2016	2017	2018 (as of April 2018)
Perlis	2,651	147	447	343	304
Kedah	11,438	1,500	1,426	1,546	3,108
Pulau Pinang	8,658	1,256	1,390	2,451	1,053
Perak	11,905	1,448	899	1,364	631
Selangor	27,809	3,274	3,798	3,821	1,408
Negeri Sembilan	7,301	620	752	680	437
Melaka	5,373	546	862	1,141	491
Johor	21,284	1,688	1,926	2,409	1,063
Pahang	9,530	1,289	1,191	1,412	814
Terengganu	7,274	852	899	1,170	738
Kelantan	8,376	1,108	755	1,063	409
Kuala Lumpur & Putrajaya	7,331	744	768	1,024	374
Sabah	9,701	1,282	1,147	1,627	806
Sarawak	10,001	1,268	1,027	1,342	722
Labuan	855	59	215	87	72
Total	149,487	17,081	17,502	21,480	12,430

Source: Food Safety and Quality Division, Ministry of Health Malaysia.

2.5.5 Food Premises Inspection and Closure

Table 2.7 revealed that Malaysia's population in 2017 has increased by 1.2 million people in two years from 31.63 million people in 2016 to 32.05 million people in 2017. The overall population growth rate is 1.3% (Department of Statistics Malaysia, 2017). Besides that, a total of 29,948,459 foreign tourists have visited Malaysia in 2017 (Astro Awani, 2018). The increasing population and overflowing foreign tourists to Malaysia have led to the increasing demand for food products and services. On top of that, the changes in the Malaysian lifestyle who prefer to spend

leisure time outside have also contributed to the increased number of food premises in Malaysia (Refer to Table 2.6).

Table 2.7: Population and Annual Population Growth Rate in Malaysia, 2016 – 2017 ('000)

Year	Total Population	Citizen	Non-citizen
2016	31,633.5 (1.4%)	28,403.5 (1.2%)	3,230.0 (3.3%)
2017	32,049.7 (1.3%)	28,723.0 (1.1%)	3,326.7 (2.9%)

Source: Department of Statistics Malaysia, 2017.

The sudden increases in food premises throughout the years have resulted in various communicable diseases problems especially food poisoning. As stated earlier in Table 2.1, food poisoning incidence dominated as the top four communicable diseases in Malaysia for the years 2016 and 2017. This situation in parallel with the growing population rate and overflowing tourists visited Malaysia for two consecutive years as mentioned in Table 2.7. The increasing number of foodborne illnesses also occurred due to food service operators' poor hygiene practices and low food safety knowledge on handling foods that have been stressed out by Abdul-Mutalib et al., (2015).

As a result, a total of 369,298 food premise inspections were carried out intensively by the Ministry of Health Malaysia including 24,280 inspections at schools and college kitchens besides 6,034 boarding schools' canteens throughout Malaysia as of September 2016 (DG of Health, 2016). Through these examinations, a total of 6,562 (1.78%) non-sanitary food premises closure were issued under Section 11, Food Act

1983 (Refer Table 2.8). Immediate closure was also issued to unsanitary food premises because it contributes to health hazards although the premise has been operated for decades. This is because errors in food preparation and handling practices may occur despite prepared by experienced food service operators. There is always a risk of consuming food contaminated caused by foodborne pathogens.

Table 2.8: Food Premises Inspection and Closure, 2015 – 2016

	2015	2016 (as of September)
Total Inspections	124,254	369,298
Total Closed	2,422	6,562
% Closed	1.90	1.78

Source: Food Safety and Quality Division, Ministry of Health Malaysia.

The huge number of food premise inspections carried out by the Ministry of Health Malaysia proves that the government was determined to improve national food safety-related issues. With food premises inspections were carried out effectively, it will eventually allow the authority to identify the remedy and problems before it turns out to be more serious food safety issues or resulted in severe foodborne incidence. Besides that, this program will also create awareness to all food service operators to improve the cleanliness of their premises and thus minimize the risk of foodborne illness to the lowest possible.

2.6 The Potential Pathogens of Food Poisoning Episodes

Food poisoning is an outcome of consuming food contaminated by a microorganism such as *Salmonella* or *Escherichia coli* (E.coli). Apart from that, contaminated food can also be originated by a virus such as *nor viruses* and parasites. (Wunderlich, Bai,

O'Malley & Chung, 2015; Brochers et al., 2010). However, *E.coli*, *Shigella*, *Salmonella* and *Campylobacter spp.* were often associated as causes of gastrointestinal disease in most food poisoning cases (Baluka et al., 2015). Described below are the usual causes of foodborne illness, sources of contaminations and symptoms (Refer to Table 2.9).

Table 2.9: Types of Foodborne Pathogens, Sources of Contamination and Symptoms

Types of Pathogen	Sources of Contamination	Assorted Symptoms
<i>Campylobacter jejuni</i>	Raw or undercooked meat or poultry, raw milk, raw vegetables.	Abdominal pain, bloody diarrhoea, fever, chills, headache within 2-11 hours, can last 7-14 days.
<i>Clostridium botulinum</i>	Soil, water, home-canned vegetables.	Weakness, double vision, fatigue, diarrhoea, paralysis; within 4-36 hours after ingestion.
<i>Clostridium perfringens</i>	Surfaces of meat and poultry.	Nausea, vomiting, abdominal pain, diarrhoea; within 8-48 hours after ingestion.
<i>Cryptosporidium parvum</i>	Contaminated water and soil.	Diarrhoea, stomach cramps, slight fever.
<i>Cyclospora cayetanensis</i>	Contaminated water and soil, fresh fruit, leafy vegetables.	Watery diarrhoea, loss of appetite, nausea, vomiting, muscle aches, fever and fatigue.
<i>Escherichia coli</i> 0157:H7	Rare or undercooked ground beef, uncooked fruits and vegetables, raw milk, unpasteurized apple juice.	Diarrhoea, severe cramping, nausea, vomiting, fever, kidney damage in children; within 1-8 days of exposure.
<i>Hepatitis A</i>	Water, shellfish, salads.	Sudden onset of fever, malaise, nausea, anorexia, abdominal discomfort, jaundice.
<i>Listeria monocytogenes</i>	Unwashed fruits and vegetables, soil, water, cold cuts, hot dogs.	Encephalitis, meningitis, flu-like symptoms.

Table 2.9: Types of Foodborne Pathogens, Sources of Contamination and Symptoms
(Continue)

Types of Pathogen	Sources of Contamination	Assorted Symptoms
<i>Norovirus</i>	Oysters, salads, frozen fruit.	Nausea, diarrhoea, vomiting, stomach cramping.
<i>Rotovirus</i>	Shellfish, contaminated water, salads, fruit.	Vomiting, fever, watery diarrhoea, abdominal pain.
<i>Salmonella enteritidis</i>	Eggs, unpasteurized milk poultry, fruits, vegetables, seafood.	Fever, nausea, vomiting, diarrhoea, severe abdominal pain; within 12 hours to 3 days.
<i>Staphylococcus aureus</i>	Meat, poultry, eggs, milk products.	Nausea, vomiting, abdominal pain; 1-6 hours after ingestion.
<i>Vibrio vulnificus</i>	Shellfish, plankton, finfish.	Gastroenteritis, septic shock; can result in death.

Source: Craig and Batholomaeus (2011).

The person who was affected by food poisoning often portrayed common symptoms such as nausea, diarrhoea, vomiting, stomach ache, fever, and headache. Victims suffering from severe food poisoning may also lead to death if not received an early treatment due to severe dehydration. Foodborne illness can be fatal if the water in the body decreases due to severe diarrhoea and vomiting as claimed by Smilth and Fratomico, (2016). Therefore, the missing fluids need to be replaced to energize the body. This is because water plays a crucial role in ensuring every important part of the body function effectively. Water helps humans to breathe normally and regulates body temperature. Besides that, water converts food into energy and removes unwanted waste from the human body (Soleimani, Foroozanfard & Tamadon, 2017).

In a different research conducted by Akabanda, Hlortsi, and Owusu-Kwarteng, (2017), the researchers revealed that food poisoning can be fatal to a group of

persons with weak immune systems such as infants and children. Besides that, an elderly with chronic health conditions also poses a higher risk if affected by food contamination. These groups of people were the most vulnerable groups being affected because infants have low immune systems while the elderly having problems with low body resistance (Abu Naser & El-Najjar, 2016). Therefore, foodborne illness victims need to seek health experts for early treatment to minimize the risk of death due to food poisoning. The definition of foodborne diseases and case classification described below in Table 2.10.

Table 2.10: Definition of Foodborne Diseases

Types of Foodborne Disease	Case Definition	Case Classification
Hepatitis A	<p>Acute illness typically including acute jaundice, dark urine, anorexia, malaise, extreme fatigue and right upper quadrant tenderness with raised alanine aminotransferase >2.5 times normal.</p> <p>Laboratory criteria for diagnosis: Positive anti HAV IgM</p>	<p>Provisional / suspected: A case compatible with clinical case description.</p> <p>Confirmed: A suspected case that is laboratory confirmed.</p>
Cholera	<p>Acute severe watery diarrhoea with or without vomiting.</p> <p>Laboratory criteria for diagnosis: Isolation of <i>Vibrio cholera</i> 01 or 0139 from stools in any patient with diarrhoea.</p>	<p>Provisional / suspected: A case that meet the clinical case definition.</p> <p>Confirmed: A suspected case that is laboratory confirmed.</p>

Table 2.10: Definition of Foodborne Diseases
(Continue)

Dysentery	<p>Acute diarrhoea with visible blood in the stool.</p> <p>Laboratory criteria for diagnosis: Stool culture and examination to confirmed possible outbreaks of specific diarrhoea, such as Shigella dysenteries, E.Coli 0157, Entamoeba histolytica.</p>	<p>Provisional / suspected: A case with bloody diarrhoea that was not lab confirmed.</p> <p>Confirmed: A clinical case that is lab confirmed.</p>
Food Poisoning	<p>Acute onset of vomiting and/or diarrhoea and/or other symptoms associated with ingestion of food. May also presented with neurological symptoms such as paraesthesia, motor weakness and cranial nerve palsies.</p>	<p>Provisional/suspected: A case that meet the clinical case definition.</p> <p>Confirmed: A suspected case in whom laboratory investigating confirms the presence of one of more food poisoning pathogens in a clinical specimen.</p> <p>However lab confirmation is not required. Should notified within 24 hour.</p>
Typhoid / Paratyphoid	<p>An illness with prolonged fever, constitutional symptoms (malaise, headache, anorexia) and hepasplenomegaly.</p> <p>Laboratory criteria for confirmation: Isolation if <i>Salmonella typhi/paratyphi</i> from blood or stool or other clinical specimens.</p>	<p>Provisional / suspected: A case that meet the clinical case definition.</p> <p>Confirmed: Isolation of <i>Salmonella typhi/paratyphi</i> from blood or stool or other clinical specimens.</p> <p>Both provisional or suspected and confirmed should be notified within 1 week.</p>

Source: Wahab, Pheng and Jahis, (2006).

2.7 Means of Preventing Foodborne Illness

There could be a risk of food poisoning to occur if unsafe handling were practiced at any stage of the food preparation process. It is also a common situation when contamination has taken place at the work station whereby cross-contamination between raw meats' juices came into contact with cooked or ready-to-eat foods. By following predetermined guidelines that have been set in place during handling, storing, and cooking processes, the risk of food poisoning can be reduced greatly.

2.7.1 Time and Temperature Control

One of the most crucial elements in food safety practices is time and temperature control. This practice is essential to ensure foods sold is in good condition and will not cause any harm to human upon consumption. This is because bacteria growth can multiply very quickly at a higher humidity condition compared to lower humidity, and since Malaysia has a humid climate, thus may provide an ideal environment for microbial growth (Hassan, Hashim, Johar & Faisal, 2014). For instance, foods that were prepared earlier than the actual serving time accelerates the growth of foodborne pathogens (Jianu & Chis, 2012). This statement is in agreement with Ababio and Adi (2012), who mentioned that foods that were left in room temperature for more than 4 hours without reheated expedite bacterial growth.

It is an undeniable fact that foodborne pathogens can multiply rapidly in a certain time and temperature conditions as mentioned by several scholars (Hassan et al., 2014; Jianu & Chis, 2012; Ababio & Adi, 2012). Bacteria grow best with a temperature range between 4⁰C and 60⁰C, which is also referred to as the temperature danger zone (Shen & Zhang, 2017). Foods that have a higher risk of

causing foodborne illness include meat and poultry, dairy products, fruits and vegetables, and fish and seafood. With these perishable products, food service operators carry the responsibility to ensure it was handled carefully by serving it accordingly which is hot foods served hot and cold foods served cold (Trickett, 2017). By practicing the appropriate serving time, the risk of food poisoning can be avoided.

Besides that, potential foodborne pathogen growth also due to temperature abuse. Both Lee et al., (2017) and Ismail et al., (2016) agreed that temperature abuse commonly occurred during storage, food preparation by food service operators and serving time. According to Mahmood et al., (2018), the appropriate cooking temperature is at least 75⁰C to secure the food is cooked thoroughly and safe to eat. In terms of temperature control, most food service operators failed to follow the stated regulations particularly on ready-to-eat foods (Ezat, Netty & Sangaran, 2013). For instance, the recent food poisoning episodes in Alor Setar, Kedah causing 2 deaths and the remaining 42 innocent lives being treated for food poisoning after consuming contaminated *laksa* noodles in Kedah (Says News, 2018). The risk factor contributing to the fatal incident was because of the unhygienic food preparation and storage as well as insufficient reheating time (New Straits Times, 2018). Therefore, it should be a major concern for all food service operators to consistently cook at the right temperature, avoid temperature abuse during storage and after cooking as well as to properly handle high risks foods in producing a safe and quality foods and services.

2.7.2 Avoid Cross Contamination

Food contamination can occur in various circumstances. For instance, food can be easily contaminated during the handling, preparation and production processes. High-risk food products which high in moisture and nutrient values such as meat and poultry, fish, seafood, fruits, and vegetables contain huge amounts of germs that easily spread to other foods and surrounding surfaces through hands such as chopping board and cooking utensils.

According to a recent article published by Singh, Walia, and Farber (2019), foodborne illness was likely to occur three times more frequent through cross-contamination. This due to the hands of food service operators as the vector of foodborne dissemination (Assefa, Tasew, Wondafrash & Beker, 2015). The occurrence of contaminated food is when foodborne pathogens were transmitted to humans via foods as a result of direct or indirect contamination while handling foods. Therefore, food service operators should use different chopping boards when it comes to raw and ready to eat foods. By avoiding the usage of the same chopping board for these food categories, the chances of cross-contamination can be reduced greatly.

Other than that, the chances of cross-contamination to happen at the food station is when juices from uncooked foods came in contact with safely cooked foods. In this case, food service operators should never let raw meat, poultry or seafood touches cooked food or any ready-to-eat foods because the pathogens from the raw meat can easily spread to cooked foods which caused cross-contamination, thus leads to foodborne poisoning. Therefore, the separation between meat and poultry, fish,

seafood, fruits, and vegetables from other readily cooked foods is crucial. Besides that, the use of separate equipment and utensils such as knives and cutting boards for handling raw foods may lower the risk of contamination. Hence, all foods need to be stored separately in designated containers to avoid contact between raw and prepared foods.

2.7.3 Good Hygiene Practice

Good personal hygiene is a basic, yet essential elements in all food handling and preparation process. The absence of personal hygiene awareness among food service operators as reported by Ismail et al., (2016) is the most reported practice that contributes to foodborne illness. The outbreaks were often linked with the transmission of pathogens handled by food service operators during food production processes. For instance, foods handled by an infected food service operators or by a person carrying a foodborne pathogen, in contact with food barehanded, improper hand washing techniques and insufficient cleaning of processing or preparation equipment.

A suggestion underlined by Baluka, Miller, and Kaneene (2015), is to consistently use clean utensils and surfaces, avoid contacts with other food products, practice hand washing regime regularly and maintaining good personal hygiene by food service operators has been the most effective practices to greatly reduce the risk of foodborne infections. This statement was consistent with a recent study by Saad, Othman and Abdullah (2019), which also found that good personal hygiene practices prior to handling food and ensuring that all utensils and surfaces are clean are essential components as preventive actions for pathogen transmission.

2.7.4 Food Safety Campaign

The enhancement of knowledgeable workforce in food safety and sanitary practices is mandatory to build awareness on the importance of food safety measures. Food service operators should be given the most exposure and awareness of food safety measures to enhance safe food handling on a daily basis. Several studies conducted conclude that food safety education campaigns assist better understanding in terms of food safety knowledge that eventually reflects good attitudes of food service operators and hygiene practices at the workplace (Olumakaiye & Bakare, 2013). For instance, safe food handling practices promoted through food safety campaigns such as BeSS and KENDIRI were enforced with the objective to raise awareness of foodborne illnesses' causes and consequences, and thus promotes safe food handling practices concerning food service operators.

As shown in Figure 1.1 in subsection 1.3, the statistics of food poisoning cases occurring in schools is increasing gradually with years. From Figure 1.1, it was clearly revealed the number of food poisoning cases in 2014 is 5,256, followed by 8,000 cases in 2015 and 6,012 cases recorded as of April 2016. These increasing food poisoning statistics have made various government agencies such as the District Education Officer (PPD), the District Health Officer (PKD), the State Education Department (JPN), and the State Health Department (JKN), worked for hand-in-hand with the national food safety policymakers to protect both students and teachers from food poisoning illness at schools. Therefore, a self-inspection program (KENDIRI) was established as an initiative to reduce the occurrence of food poisoning episodes involving schools.

The Self Examination Program (KENDIRI) is one of the government's initiatives to minimize the risk of food-related hazards occurrence, especially in school canteens and hostel's kitchens. It is a collaborative program between the Ministry of Education and the Ministry of Health Malaysia since 2008. The implementation of this program will help food service operators to improve the level of food safety and hygiene standards in schools. This is because KENDIRI acted as the first line of defence in food poisoning prevention at schools. This program involves the participation of kitchen owners to self-conduct the inspection on the level of cleanliness of each premise. KENDIRI program is conducted in daily basis and monitored by the school, the District Education Officer (PPD), the District Health Officer (PKD), the State Education Department (JPN), the State Health Department (JKN), the Ministry of Education (KPM) and the Ministry of Health Malaysia (MOH).

Table 2.11 revealed the number of registered schools in Malaysia against the number of schools performed KENDIRI for the years 2014 and 2015. The requirements for employee education and training by food service facilities have been shown to have a positive influence on food hygiene in schools. This can be proven from the increasing numbers of few states such as Sarawak, Negeri Sembilan, Labuan, Kuala Lumpur, and Melaka conducting a self-inspection activity at school canteens. However, the number of schools performing KENDIRI was relatively low compared to the number of registered schools. Therefore, food service operators in each premise should perform self-inspection activity in daily routine to monitor the food preparation process in accordance with the food safety guidelines provided as in

Food Act 1983 and Food Hygiene Regulations 2009 and thus reduced the risk of consuming contaminated foods in schools.

Table 2.11: Number of Registered Schools in Malaysia vs Number of Schools Performed KENDIRI, 2014 – 2015

State	No. of Registered Schools in 2015	KENDIRI 2014	KENDIRI 2015
Putrajaya	25	10	10
Labuan	26	22	25
Perlis	104	81	72
Kuala Lumpur	305	304	309
Melaka	313	94	164
Pulau Pinang	398	285	247
Negeri Sembilan	473	148	151
Terengganu	499	188	56
Kelantan	592	218	70
Pahang	731	284	233
Kedah	745	112	12
Selangor	930	657	163
Perak	1098	438	133
Johor	1178	334	198
Sabah	1290	175	35
Sarawak	1452	69	84
Total	10159	3419	1962

Source: Food Safety and Quality Division, Ministry of Health Malaysia.

2.8 Selected Global Food Poisoning Episodes

Someone around the world deals with the consequence of consuming unsafe food every day. The cases of food poisoning episodes may be taken lightly and were given little attention by a person who was not affected. However, it is a known fact that the

consumption of unsafe food products could be fatal. Follows are several selected food safety-related cases around the world.

2.8.1 Food Poisoning Caused the Death of 23 Children in India

The heart-breaking news took place in a school in Bihar, India's on July 16, 2013. As reported by Daily Express (2012), the affected 23 children died after eating foods contaminated by pesticides. From the report, it is found that the food service operator who has the operational responsibility on the incident day has mistakenly used the pesticide oil that was assumed as the normal cooking oil for cooking. The meals were prepared for a free lunch program under the government. However, the event turns out a disaster with 23 dead, leaving 24 children including the cook hospitalized (Daily Express, 2012).

2.8.2 Uncooked Curry Leaves Sickens Over 400 Visitors in England

More than 400 visitors showed food poisoning symptoms such as diarrhoea and vomiting at a Street Spice Festival event held in Newcastle, England. The three-day event which was held from 28th February until 2nd March 2013 has attracted more than 12,000 visitors to attend the festival (BBC News, 2013). It was the country's largest outbreaks as claimed by the city council. Prior to further investigation by Public Health England (PHE) and Newcastle City Council, a laboratory analysis suggested that *E.coli* and *Shigella* were found to be the main cause of the major outbreaks. The microorganism was found in curry leaves used in chutney dishes. However, no one was charged in this incident since there were no clear instructions on the danger of using curry leaves and other herbs in recipes. Besides that, the investigation also revealed that the overall hygiene levels during the entire event

were in good condition. So there were no issues of cleanliness. As a result, the country's Food Standards Agency has enforced a workable policy that underlines the guidelines and potential food hazards while handling herbs in preparing dishes with the aim to avoid a repeat of such incidents in the future.

2.8.3 World's Best Restaurant Served *Nor Virus*

Noma Restaurant was pronounced as "The Best Restaurant in the World" for three consecutive years from 2010 to 2012 by Restaurant Magazine (The Copenhagen Post, 2013). The restaurant was located in Copenhagen, Denmark. It was recognized for the amazing and delicate dishes served each time. However, the restaurant's reputation somehow reduced dramatically after the incident of 67 restaurant guests sickens with *Roskilde Sickness*, due to exposure to *Nor virus* (also known as *Norovirus*) which caused vomiting and diarrhoea. This unfortunate incidence happened on 12th and 16th February 2013. The Copenhagen Post reported that there has been illness among the food service operators who handled the food products. Upon further inspection at the kitchen, there were no hot water taps provided for the hand washing regime by the food service operators at the work station (The Copenhagen Post, 2013). As the result, the respected food authorities went to the restaurant as a drastic action upon guests' complaints and criticized Noma Restaurant for not disinfecting the kitchen in a timely manner as a way to prevent the contagion from spreading (The Copenhagen Post, 2013).

2.8.4 Conclusion of Global Food Poisoning Incidents

All of the above incidents are inter-related and relevant whereby lack of an effective food safety management system was practiced. Similar incidents might have repeated

in the future either in the same country as discussed above or to those nations that were lack in an effective strategic approach to food product safety management (Boddie & Kun, 2014). Conclusively, strict enforcement on of food safety practices from farm to fork might have prevented these unfortunate incidents to occur thus enabling global safe food products produced.

2.9 Selected Food Poisoning Episodes in Malaysia

A considerable amount of literature has been published concerning foodborne illness associated with food service operators (Reboucas et al., 2017 & Viator et al., 2015). Malaysia's food poisoning cases are increasing gradually each year with a total of 12,122 foodborne outbreaks recorded in 2014. From this figure, 5,265 (43%) of food poisoning cases involved school canteens and cafeteria. As a result, 246 premise closure were instructed due to failure in complying with food safety standards in the Food Safety Regulations 2009 (Mstar, 2014).

2.9.1 Food Poisoning at Wedding Banquet Leaves 4 Dead, 65 Warded

A contaminated chicken dishes served at a wedding banquet in Kampung Huma, Tanjung Dawai, Sungai Petani Kedah were found to be the major cause of the incident. Much worst, the catastrophic food poisoning incident leaves 4 dead, 65 warded and the remaining 170 guests seek health experts for further treatment. The incident happened on 1st October 2013 as reported by Astro Awani. This fatal tragedy has gained the full attention of the media as well as national food industry experts because this is the worst food poisoning incident ever happened in the country which took place at a wedding ceremony. According to the media, most of

the food poisoning victims started to show early signs of the symptom such as diarrhoea and vomiting on the evening of the event (Astro Awani, 2013).

Nurshazana, 24, was one of the affected victims who suffered the most whereby the body was very weak, fainted and unable to move. By looking at the worsening condition, the family brought her to Sultan Abdul Halim Hospital in Sungai Petani for further treatment. However, she was pronounced dead upon arrival on the same day. While the other two victims were Mohd Nor Rahmat, 11 and Ibrahim Mohamad, 62 years old respectively. Having the same symptoms as Nurshazana, both of the affected victims were then rushed to Yan and Sultan Abdul Halim Hospital separately after their conditions worsen. However, both the victims did not make it and were pronounced dead in the evening of the same day (The Star, 2013).

The fourth victims identified as Wan Razali Yaakob, 56, also pronounced dead at 7.15 p.m. after being admitted to the Intensive Care Unit (ICU). On the other hand, six PMR (Penilaian Menengah Rendah) candidates who will sit for the examination on the next day were amongst the food poisoning victims who attended the wedding banquet (Sinar Harian, 2013). Six of the PMR candidates ended up taking the examination at the hospital's bed despite the illness. As claimed by the host, the feast was held on a rally but it was said that the only guests attending the afternoon banquet were poisoned (Sinar Harian, 2013). Further investigation was made by the state health authority and from the laboratory result analysis, it was revealed that there is a presence of *Salmonella* bacteria in the chicken dishes that have caused the illness (Berita Harian, 2013).

2.9.2 The Famous Laksa in Kedah Claimed 2 Lives

Datuk Dr. Noor Hisham Abdullah, Chief Health Director, Ministry of Health Malaysia has confirmed that there were 83 food poisoning cases with 2 victims who died after being reported consuming *laksa* noodles bought at a roadside stall in Kupang, Baling on 8th October 2018. From the 83 cases, 34 including 2 dead victims were reported in Perak, 25 cases in Kedah and 24 cases in Selangor. (Berita Harian, 2018a).

Prior complete investigation conducted, a complete laboratory analysis result released on 21st October 2018 from both Sungai Buloh National Public Health Laboratory and Penang Food Safety and Quality Laboratory, has confirmed that the illness was caused by a food poisoning agent known as *Salmonella enterica serovar Weltevreden*. The presence of these bacteria has been found in the patient's clinical samples and samples from the *laksa* noodles itself. Chief Health Director, in his statement, stated that the same bacteria were found in the *laksa* noodles which was bought on 4th October at the food premise. He added, *laksa* noodles sold on 4th October was processed and produced at the premise by the owner itself, Daud Ismail.

According to the report, the risk factor contributing to the food poisoning illness may be due to the improper preparation processes and unhygienic storage involving *laksa* noodles. On top of that, temperature control during the production of *laksa* noodles is inappropriate besides insufficient preheating temperature of *laksa* noodles to be completely disinfected before consumption.

Based on the newspaper article, the owner, Daud Ismail, 51, claimed that he has been running the family business for 15 years till now, following the same old recipes, the same cooking techniques and to consistently check on the ingredients' freshness before starts selling. He has been practicing the same routine for the past 15 years, but this is the first time he ever faced such problems. Despite being saddened on the reckless accusation from the public for selling poisonous *laksa* noodles, Daud adheres to MOH's instructions under the Prevention and Control Diseases Act 1988 in closing the premises since 8th October. The stall can be operated normally once he complied with the Food Act 1983, Food Regulations 1985, Food Hygiene Regulations 2009 and the requirement underlined by the local authorities. He also hoped that the truth on the causes of food poisoning is revealed soon. Daud also said that he sold 50 to 100 kilograms of *laksa* noodles every day and the amount might be bigger during holidays. Before the interview with media ends, he also expressed his deepest condolences to the deceased's family members on the fatal incidence involving his *laksa* noodles.

By referring to news published by Berita Harian, one of the food poisoning death victim in Perak is a 28-year-old disabled man. According to the deceased's father, Abdul Manan Abdul Hamid, 58, his son loved to eat *laksa* noodles especially those sold at Kupang, Baling. The father had bought 3 packs of *laksa* noodles to be eaten together with the rest of the family members at home. However, all of the family members suffered from unusual diarrhoea later at night on the same day. The family was then rushed to Grik Hospital for further treatment. Unfortunately, the disabled man could not be safe and was pronounced dead at 8.15 p.m.

In a different case in Perak, another victim did not expect that her excitement to try the famous *laksa* noodles in Kupang, Baling has turned out an unforgettable tragedy when her beloved mother passed away from food poisoning illness. The deceased, Raseah Ali Musa, 70, was said to have been suffering from endless diarrhoea and vomiting on Saturday morning with her daughter, Norliza Shaari. According to Norliza, both mother and daughter was admitted to Grik Hospital on Saturday at 10 a.m. However, the mother was pronounced dead the next day at 9 p.m. Meanwhile, most of the *laksa* noodles poisoning victims expressed their regrets and felt discouraged to consume *laksa* noodles ever again (MyMetro, 2018).

Based on the chronology of food poisoning affected in Selangor, one of the customers has bought the *laksa* noodles in Baling on 4th October. He then headed home in Selangor once purchased. The *laksa* noodles will be served during a thanksgiving ceremony held at his house on the next day (5th October). Meanwhile, the *laksa* noodles' gravy was prepared by the host during the night of 4th October. Once the gravy is cooked, it was stored in the pot and allowed to warm overnight. According to the newspaper articles, from 27 people who ate the *laksa* noodles, only 24 people showed signs of food poisoning with diarrhoea, vomiting, fever, headache and abdominal cramps (Berita Harian, 2018a).

2.9.3 Restaurants' Food Surplus Causes Food Poisoning

A recent food poisoning episodes in Kedah involving students have been reported in Mei 2019. A total of 150 students from Darul Aman Al-Quran Institute (IQDAR) Alor Setar were exposed to vulnerable food poisoning cases after consuming Arabic rice with chicken dishes (Berita Harian, 2019). The 31 affected students were aged

between 18 and 23 years old, with 15 female and 16 male students showing food poisoning symptoms such as stomach ache and diarrhoea have received an outpatient treatment at the nearest hospital. These students are undergoing Tahfiz Al-Quran and Al-Qiraati Diploma program at the said institute.

Muhammad Yusni Yaakob, Deputy Director of IQDAR said, he was only aware of the illness involving students at 8 o'clock on the next morning. He was informed by lectures that many students were absent from the classroom. Surprised with the number of missing students during the school period, the lecturers examined students' dormitory beforehand and found out that students were suffering from vomiting, diarrhoea and dizziness thus answers the reason for the student absence.

According to Yusni, the affected food poisoning victims were believed to have eaten Arabic rice with chicken dishes last night. A total of 150 packets of the dishes were donated by an Arabic restaurant at 11 p.m. Based on the victim's statements, some of them only ate the dish between 1 a.m and 5 a.m.

Meanwhile, one of the students, Muhammad Afham Anwar, 20, confessed on eating the dishes at about 1 a.m before suffering from stomach ache. He also stressed out that the dishes were still in good condition with no unpleasant smell and the taste is good while enjoying it this morning. However, he started to feel the pain at 2 a.m., but he still managed to sleep because the pain is slowly healing as time passes by. He only started having diarrhoea at 8 a.m. when he is about to go for lectures on the next day.

Another food poisoning victims, Marwadah Anuar, 20, on her statement saying that she had the dishes at 5 a.m and felt dizzy, stomach ache and vomiting after Subuh prayers. According to Marwadah, the Arabic rice is still in good condition, however, the chicken dish has an unpleasant smell causing her to leave the chicken untouched.

Meanwhile, Kota Setar District Health Office which received the food illness complaint has identified the causes that trigger food poisoning among students at the institution. The result from the investigation found out that the rice and side dishes given to the students were from the restaurants' surplus food that was unsold at the nearby food premise. State Health Director, Datuk Dr. Norhizan Ismail said the rice and chicken dishes were sent to the institution at 11 p.m. yesterday and the students only started consuming the dishes at midnight on the same day. Samples from the said contaminated dishes were taken and send for analysis. The laboratory results revealed that the chicken dishes with an improper cooking technique were found to be the cause of the illness.

As a consequence, Kedah's State Health Department (JKN) has ordered the respective Arabic restaurant immediate closure under Section 11 of the Food Act 1983 for further investigation and cleaning purposes. The closure notice is due to the food poisoning incident reported involving IQDAR students (Harian Metro, 2019).

2.9.4 More Food Related Illness in Kedah Involving Students and Chicken

71 primary students from Sekolah Kebangsaan Tasek Apong in Sungai Petani, Kedah experienced symptoms of food poisoning since yesterday. These students were suspected to have foodborne illness after consuming *nasi lemak* served with

chicken dishes after “*Merentas Desa*” program held at the school last Saturday (9th February 2019).

Kedah Health Director, Datuk Dr. Norhizan Ismail in his statement to the media stated that Kuala Muda District Health Office has received the information at 10 a.m. yesterday (11th February) based on their parents' complaint. Based on the information provided, health officers from the district health office visited the school at 10.30 a.m. on the same day. They found out that 66 students were absent from school. Further investigation conducted revealed that a total of 71 students have had the same symptoms (Bernama, 2019).

Datuk Dr. Norhizan in his statement to Bernama, two students being treated at a private hospital due to the symptoms. One of the students was discharged whereas the student who is still warded was reported in a stable condition. On the other hand, three students having the same food poisoning symptoms have sought treatment at Sultan Abdul Halim Hospital and were treated accordingly. Meanwhile, the remaining students received home treatment and still recovering.

Preliminary investigations suggested that the outbreak is suspected from *nasi lemak* served with chicken dishes which the school has ordered from an outside caterer. The school held an annual “*Merentas Desa*” program and has ordered the dishes to be served to the students and staffs on the event day. A total of 480 students involving Year 3 to Year 6 students have participated in the run. However, further investigation pertaining to the outbreak will be conducted to identify the main cause of foodborne illness.

Datuk Dr. Norhizan also urged the parents to refer their children to health experts for further treatment if they are showing symptoms of food poisoning such as vomiting, diarrhoea, abdominal cramp, nausea, and dizziness or had consumed the said dishes during the school program. Ending his statement, Datuk Dr. Norhizan advised schools to cater foods from the school canteen instead of ordering it from the outside caterer. This is because all food service operators appointed at the school canteens were trained on food safety and knowledgeable in handling foods in large quantities. Besides that, he also instructed the school to consistently monitor the affected students' condition and to inform the nearest health office immediately if such an outbreak repeated.

2.9.5 29 Students Suffers Food Poisoning in Kelantan

On 7th April 2016, Sekolah Kebangsaan Tiong, Kota Bharu, Kelantan triggered a panic situation to the school staff when 29 of their students were positively affected by food poisoning illness. The students showed food poisoning symptoms such as stomach ache, diarrhoea, and vomiting after consuming spicy chicken dishes during the recess period at the school canteen (Malay Mail Online, 2016). As a result, the Kelantan state authority has directed the school canteen's closure immediately for two weeks minimum for further investigation purposes. He added, there will be no compromise for contract termination if food service operators were proven to neglect food safety measures during preparing dishes for the students and staffs (Malay Mail Online, 2016).

2.9.6 Conclusion of Food Poisoning Episodes in Malaysia

The above elaborated never-ending food poisoning episodes in Malaysia proved that there were in dire need to strengthen the national food safety management practices. This is because food safety is a very serious concern since it threatens people's life. Based on the above foodborne incidents occurring in our nation, it is affirmed that food service operators hold the biggest responsibility in the kitchen in producing safe food consumption to the people.

Therefore, more emphasize should be highlighted to food service operators who deal with foods in the food industry line. The establishment of improved food safety standards – BeSS recognition, was hoped to cater food service operators' attention and boost their motivation in consistently follows the food safety standards and guidelines in daily routine practices. On top of that, requirements underlined in Food Act 1983, Food Regulations 1985 and Food Hygiene Regulations 2009 must be executed accordingly. Nevertheless, continuous support and practicing favourable attitudes from all related parties is indispensable to uphold every food safety campaign by the authority committedly. By doing this, the risk of foodborne illnesses' occurrence caused by food service operators' negligence while handling food will be greatly reduced.

2.10 Underpinning Theory

Variety food safety issues have been reported worldwide for the past few decades. For instance, foodborne outbreaks caused by food contaminants, pesticide exposure, antibiotic resistance, and environmental effects. However, most of the illnesses were closely related to food service operators' handling practices (Cimino, Boyles, Thayer

& Perry, 2016; Zhao, Zhao, Wang & Zhong, 2017). As agreed with Cimino et al., (2016), the risk of food poisoning occurrence is likely contributed by the effectiveness of the food product safety management system in one's business.

As mentioned by Hailegebreal (2017), the sources of raw materials may also be the factor of pathogen transporter. The scholar addressed the concern on how the raw materials need to be handled and stored accordingly. Referring to Hailegebreal (2017), raw materials should be handled in a convenient time and appropriate temperature control. This is because the exposure weakens a business' food handling activities and also the food product safety management system as a whole. However, by practicing full and proper hygiene precautions along with the food handling and preparation activities eventually helps to minimize the risk of food poisoning.

On the other research, Seaman (2010) revealed that the statistics of foodborne outbreak cases is rising gradually due to poor handling practices by the food service operators even though the education program in regards of hygiene knowledge is comparatively high (Refer Table 2.3 and Table 2.4). Furthermore, food handling practices were influenced by food handling education program. Seaman (2010) also mentioned that the effectiveness of the training program needs to be evaluated in a timely manner. This is because the results from the evaluation will reveal how far the training conducted assist food service operators in the kitchen. Besides that, the result obtained is practical for the key decision-makers whether or not to upgrade the training module based on requirements. Thus, the adaptation of Knowledge, Attitude, and Practice (KAP) model can be used as a tool to measure the effectiveness of food handling training program and BeSS recognition.

KAP model studies emerged as an interdisciplinary research method in the 1930s in developing countries. The model has been widely used by previous studies on evaluating various training programs and module assessments (Salem et al., 1999; Marías & Glasauer, 2014; Lou et al., 2017; Zhou et al., 2017 & Liu et al., 2018). KAP model is best conducted especially in social research studies. This is because KAP model evaluates changes in human knowledge, attitude, and practices as a response to a specific project. For instance, educational and training programs. Besides that, KAP model also being used in evaluating intervention strategies on the certain phenomenon as done by Liu et al., (2014) in his research.

On top of that, KAP studies can also be used as a tool to discover people's barriers and constraints in implementing or practicing subjected projects. The ability to identify people's changes in knowledge, attitude, and practices are essential since the result obtained reveals the minimum values for evaluating outcomes on audiences (WHO, 2008).

In accordance with Figure 2.3, KAP model assumes that knowledge (K) of an individual will process information obtained and directly influence a change in attitude (A). Next, with the knowledge and attitude will be expressed in the form of practice (P) as the results outcomes (Seaman & Eves, 2006).

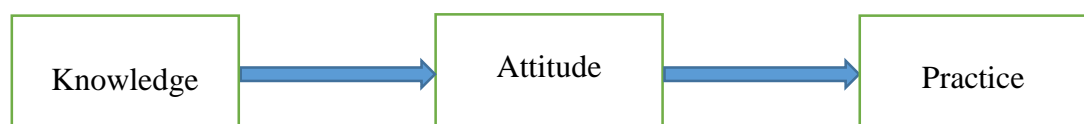


Figure 2.3: Knowledge, Attitude and Practice (KAP) Model.
Source: Adopted from Alzghoul and Abdullah (2015).

In a KAP model, as highlighted by Kaliyaperumal (2004), knowledge can be interpreted as a set of understanding and belief of any given topic. It is also the capacity of an individual to perceive and conceptualize a phenomenon. In a different study conducted by Gumucio et al., (2011), the scholar discovers that the degree of knowledge assessed by the survey helps to locate areas where information and education efforts remain to be exerted.

On the other hand, an attitude refers to an individual feeling or act towards certain circumstances and the tendencies on how to react (Kaliyaperumal, 2004). There were some arguments on how to evaluate an attitude as it is not as detectable as practices were. Therefore, it is a good idea to access how knowledge influences one's attitude.

Lastly, the practice reflects the ways an individual demonstrates knowledge and attitude through actions (Wang et al., 2015). In comparison with attitude, the practices of an individual are easier to be observed because it usually demonstrated through an individuals' act by responding to a stimulus. However, there is also research discovering that attitude and practices sometimes showed no or relatively low connection (Gumucio et al., 2011).

In accordance with the above explanation, the present study implemented KAP model to enable the researcher to access the effectiveness of established food safety programs in terms of food service operators and safe handling practices. Other than that, KAP model is very useful in identifying knowledge gaps, differences in cultural acceptance and behavioural patterns that may expedite an individual understanding and action. Besides that, KAP model also assists the researcher in identifying factors

that influence changes in attitudes, the reason for such behavioural, how and why people behave in such attitudes. The researcher also adapted KAP model in the present study as a means to ease the communication process in terms of defining the effectiveness and identifying drawbacks in the national food safety management system. Finally, by implementing KAP model in the present study also expected to reveal true barriers and constraints in the designed program as well as the best explanation and solutions in improving the quality and accessibility of food product safety management systems.

A large and growing body of literature has investigated the level of food safety compliance practiced by food service operators using KAP model as a survey tool (Sihombing et al., 2018; Zanin et al., 2017 & Siau et al., 2015). KAP model was adapted as underpinning theory in the present study as a representative to gather information on the basic idea of food handling practices, focusing on food service operators. Besides, the model adapted is expected to be able to reveal not only the characteristics traits in knowledge, attitude, and practices of food service operators about food safety practices but also the idea of an individual tend to not react as an individual should react under certain phenomenon. These items are often the sources of misinterpretations and misunderstandings that may result in an obstacle to the designed food product safety management program in food businesses.

2.10.1 Food Service Operators' Knowledge Level

Based on previous literature reviews, there are several risk factors contributes to food poisoning diseases. For instance, food service operators' knowledge prior to safe food handling. As argued by Sani and Siow (2014), food service operators must

participate in food safety education programs organized by recognized food handlers' training schools since the person who deals with food having the higher potential to contaminate the food during any stage of food production processes.

By referring to a study done by Griffith (2010), the researcher mentioned that food service operators normally will emphasize knowledge and beliefs during food handling and preparation processes, which is correspond to research by Sani and Siow (2014). In another study conducted by Gaungoo and Jeewon (2013), the researchers also agreed on the importance of well-versed knowledge in regards to practice safe food handling can be further enhanced through training and education programs. Hence, it is proven that serious attention should be given in educating food service operators on safe food handling procedures to reduce the risk of cross-contamination.

In the Malaysian setting, all food service operators in the food business line are compulsory to attend the once-in-a-lifetime food handling course held by Food Handlers Training School. A license will be given out to participants who completed the course successfully (Abdul-Mutalib et al., 2012). As a result of the training, food service operators will gain valuable knowledge particularly in handling and preparation of food and the factors contributing to food poisoning. Besides that, training and education programs were also intended to develop advanced knowledge, introducing new skills and attitudes through the learning experience and also to achieve effective kitchen performance (Sprenger, 2009).

As argued by Jianu and Golet (2014), food contamination may occur at any stage of food production which is either during preparation, processing or storage. Accidents may happen if food service operators neglected proper food handling practices at their premises. Eggs products, mixed foods, fish and meat products were the most frequent food sources to be contaminated. This is because, all animal products are loaded with bacteria, microorganisms, and dioxins besides being a host of serious health problems if the food products were mishandled (Trickett, 2017). Therefore, food service operators who dealt with meat and poultry must be knowledgeable in handling it in terms of cooking time, temperature control, and means to avoid contamination during the entire cooking process. Without a well-versed knowledge, food service operators might unconsciously perform cross-contamination activities while handling the food products (Zanin et al., 2017). Besides that, a clean chopping board and proper utensil used in handling meat and poultry is also an important aspect that food service operators often overlooked (Jianu & Golet, 2014).

However, Jianu and Golet (2014) revealed that an increase emphasized given on training and education programs and having high food safety and hygiene knowledge does not always positively translated into good food safety practices implementation. This statement has also been supported by Ko (2013), Gaungoo and Jeewon (2013), and Jianu and Chis (2012), whereby knowledge alone does not guarantee the change of individual behavioural changes. Despite having a well-versed knowledge in food safety knowledge, mishandling of food and lack of insaniary of food service operators facilitates the transmissions of foodborne pathogens into the foods served which caused food poisoning to end consumers.

Even so, food safety training and education program provides an individual the basic platform to perform well in the kitchen with food safety education background and thus motivates hygienic practices. In most foodborne outbreak cases, the low level of knowledge and incompetent food handling practices in the kitchen are the benchmark of insufficient training programs for the food service operators (Jianu & Chis, 2012). There were several reasons for training and education program failure highlighted by the researchers. For instance, high staffs turnover, poor motivation due to relatively low earnings, low educational level, cost and the risk of training investment mostly occurred in small and medium-sized enterprises (SMEs) (Jianu & Chis, 2012).

2.10.2 Food Service Operators' Attitude Level

Besides the importance of food safety knowledge, the reduction trend of the foodborne outbreaks in a food business also depends on the attitude performed by food service operators (Ovca et al., 2018). By referring to a statement by Schirone et al., (2017), neglecting human behaviour in food safety-related matters can be fatal.

Over the past 20 years, greater attention has been given to food service operators' attitude performance rather than just the provision of food safety knowledge and this could prove particularly useful in helping to reduce levels of food poisoning in the future caused by food service operators' faulty (Baser et al., 2017 & Al-Shabib, Mosilhey & Husain, 2016). It has been suggested by Griffith (2010) that poor food handling practices contributed to 97% of foodborne illness outbreaks in food service businesses which the most frequently reported causes for outbreaks. If correct, this would make food service operators' handling attitude the single most important factor affecting the control of food hazards.

On another study by Yazdanpanah and Forouzani (2015), the scholars analysed the evaluation of someone's attitude often associated with how an individual views on a situation, the sense of being immersed in a situation, and eventually projected through its behavioural responses. Rutter (2002) in his study, revealed that attitudes may influence an individual intended to perform a given behaviour or practice. Based on the above arguments, attitude is thus correlated with reflected practices. Once the food service operator's attitude has been identified as a barrier in performing an excellence kitchen performance, more concern should be emphasized on the consequences of such an attitude which may jeopardize health hazards and business operation as a whole (Griffith, 2010).

As stressed out by Sani and Siow (2014), continued education and practicing a favourable attitude are highly correlated in performing an excellent kitchen performance. These aspects need to be considered concerning the hygiene behaviour of the food service operators employed. This is because foodborne outbreaks do not happen by accident. For instance, if undercooking of food is identified as a contributing factor to foodborne illness, this could be due to faulty equipment, changes of raw materials or human error (Jenie, Nor, Sharif & Saad, 2016). The situation correlates with a poor attitude and handling practices posed by food service operators in daily routine. On top of that, full management support was required to consistently maintain safe food practices especially when dealing with bulk quantities.

2.10.3 Food Service Operators' Hygiene Practice Level

In recent years, there has been an increasing amount of published literature about food safety. Numerous studies have attempted to explain on an improper food handling practices during the food production process as a major contributor to foodborne illness (Chai, Cole, Nisler & Mahon, 2017; Ismail, Chik, Muhammad & Yusoff, 2016).

An improper food handling practices were also one of the main factors contributing to foodborne outbreaks as stressed out by various studies (Moreb, Priyadarshini & Jaiswal, 2017; Rossi et al., 2017; Abdul-Mutalib et al., 2015 & Kleter et al., 2009). Lack of food service operators' self-hygiene, improper sanitary practices (Soon et al., 2011), unclean environment and water supply (Meftahuddin, 2002) were the most common factors contributing to the illness. Other than that, a poor sanitary condition in the food premises also posed a significant risk of food poisoning incidence as emphasized by Ababio and Adi (2012).

By referring to research by Callejón et al., (2015), food service operators were the vehicle of microorganism dissemination through contact with foods besides unclean kitchen counters (Linscott, 2011). This statement was also supported by a study conducted by (Soon et al., 2011). The authors notified that an unsanitary food handling procedure contributes up to 50% of food poisoning episodes in Malaysia. Meats and dairy products were the most frequent sources of food-related outbreaks (Pires, Vieira, Perez, Wong & Hald, 2012).

Another study by Woh et al., (2017) revealed that food poisoning outbreaks in Malaysia often associated with unhygienic food handling practices and poor sanitation levels. This statement was in agreement with Zaid, Jamal and Razak (2011) which also claimed that cleanliness of food service operators can be clearly observed through hand washing activities during food production, wearing clean clothes, applying apron while preparing food, keep hair and fingernails trimmed as well as wearing a clean shoes during the entire business operation at the premise.

On the other hand, Ezat, Netty and Sangaran (2013) claimed that unhygienic food service operators associated with food-related diseases at the United State of America. According to the Centres for Disease Control and Prevention (CDC), the developed nation recorded 48 million food poisoning illnesses in 2013 with 128,000 hospitalized and 3,000 death annually. The increment of foodborne disease statistics in the country urges an in-depth investigation on the level of hygiene practices among food service operators as food safety issues may also be driven by unhygienic food handling practices (Ababio & Adi, 2012). This is because foodborne pathogens can be easily transmitted from farm to fork.

The recorded statistics also proved that hygienic food handling practices help to minimize pathogen transfer from food service operators to consumers. This is because food service operators acted as prevention of foodborne illness, thus significant actions must be taken to reduce the number of pathogenic microorganisms to the minimum level which can be done through maintaining a good sanitary practice (Zhang, Lu, Liang & Huang, 2015). Besides that, food service operators

must also be exposed to the importance of hygiene and cleanliness practices through rigorous education and awareness campaigns by the government.

Therefore, food service operators should consider on the importance of maintaining an appropriate food safety and hygiene practices which includes slaughtering processes where the raw meat came into contact with cutting boards, knives and hands of the food service operators, well trained and have a good personal hygiene (Ababio & Adi, 2012).

2.11 Research Framework Development

The well-known concepts and studies regarding the research topic have been discussed thoroughly earlier in this chapter. It was useful in developing the research model for the present study. Therefore, this section illustrates both the conceptual and research framework of the present study.

2.11.1 Preliminary Conceptual Framework

A preliminary conceptual framework was developed to discuss the concepts and theories involved in the present study (Elliot & Higgins, 2012). It assists the researcher in explaining the construct to be studied visually and the relationship between the variables. A preliminary conceptual framework of the present study has established as a result from the extensive literature review done by the researcher. Normally, an initial conceptual framework more prone to qualitative studies. Therefore, the initial conceptual framework of the present study was presented in Figure 2.4 as follows.

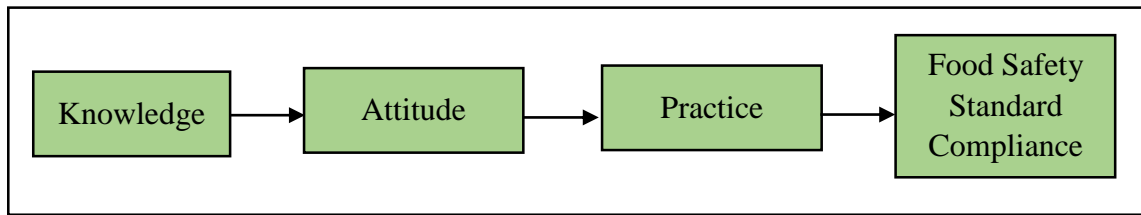


Figure 2.4: Initial Conceptual Framework

The foundation of the initial conceptual framework is that the relationship between knowledge, attitude, and practice is often explained through KAP model. These three traits portrayed by the food service operators while handling foods were recognized as the critical factors which determine whether or not they meet the food safety standard compliance level as stated in the Food Act 1983 and Food Hygiene Regulations 2009 and thus ensures the safety of food prepared. The initial conceptual framework of the present study also assist the researcher to identify which of these three traits triggers the occurrence of food poisoning episodes in Kedah and finally able to determine on the food safety standard compliance level of the food service operators.

2.11.2 Improved Conceptual Framework

Figure 2.5 illustrates an improved conceptual framework that anticipated demographic profiles of respondents as variables in the present study. The integration of demographic variables such as personal statistics that includes information such as gender, age, level of educational, working experience in food industry, participation in food handling training, awareness and the importance on BeSS recognition and typhoid injection would be beneficial in explaining the differences characteristics of a population-based on the diverse respondents' background.

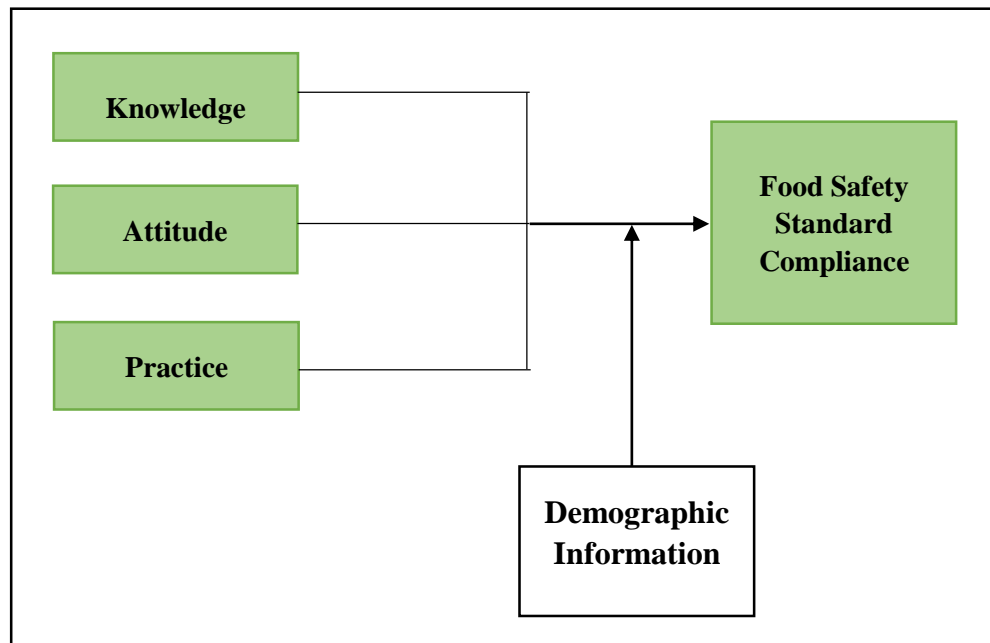


Figure 2.5: Improved Conceptual Framework

Apart from that, a conceptual framework is an appropriate tool in the present study to address which of these three traits factors contribute the most to the increasing number of food poisoning episodes in Kedah. It also assists the researcher in determining the level of food safety standard compliance imposed by food service operators in Kedah.

2.11.3 Finalized Conceptual Framework (Pre-Testing)

The finalized conceptual framework (pre-testing) of the present study were visualized in Figure 2.6. It was developed based on both initial and improved framework as presented in the previous subsection.

Based on the framework in Figure 2.6, knowledge, attitude, and practices were identified as the critical factors which will affect all of the items in food safety standard compliance level among food service operators. On the other hand, the selection of demographic information as a variable will be further explored for its

moderation effect on the dependent variable. Also, propositions and hypotheses statement will be developed based on the finalized conceptual framework (pre-testing).

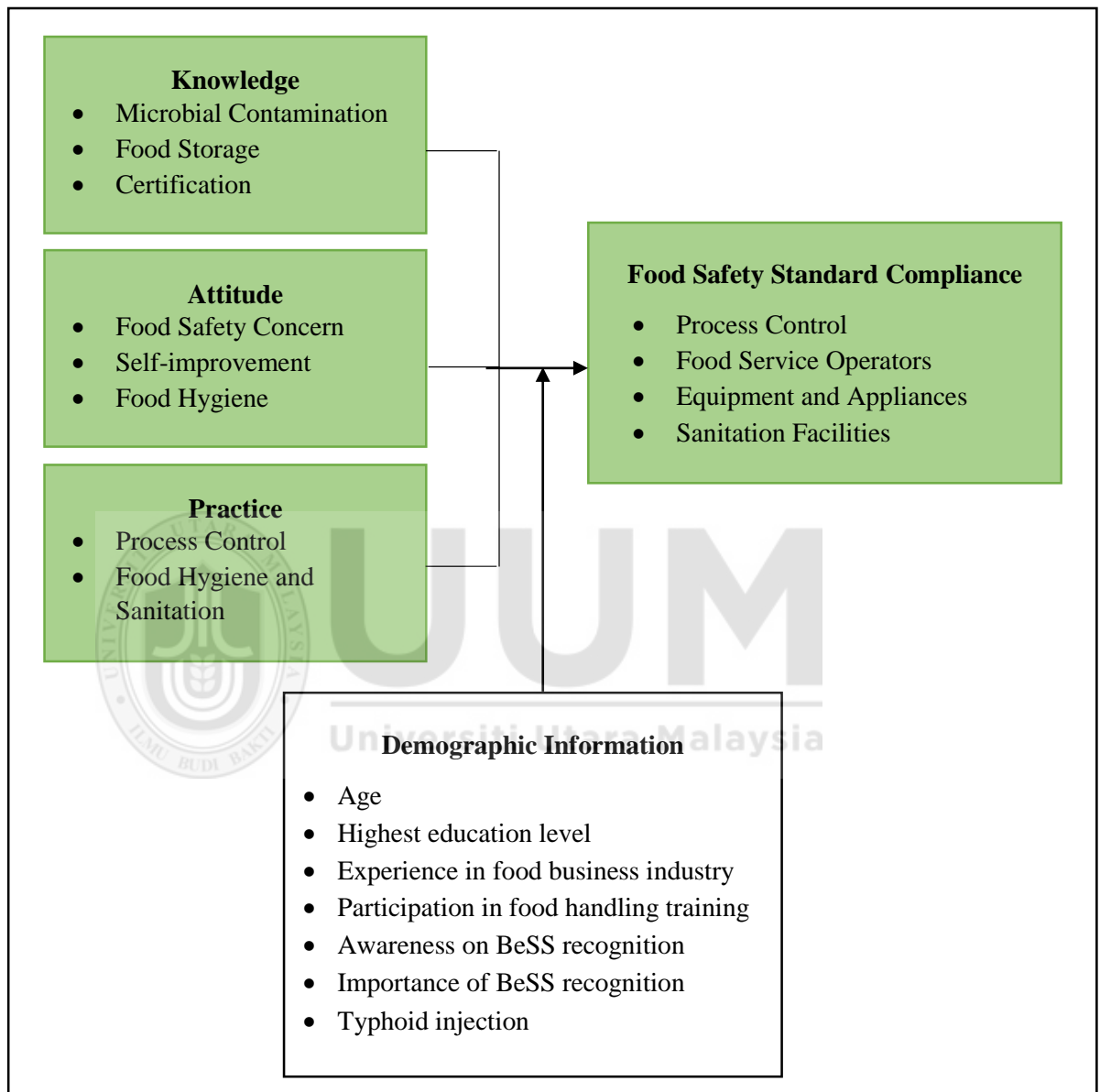


Figure 2.6: Finalized Conceptual Framework (Pre-Testing)

2.11.3.1 Food Safety Standard Compliance

As a result of an improved conceptual framework, all of the 4 items that have been identified such as process control, food service operators' working condition, equipment, and appliances used in daily operation and sanitation facilities in the

premises will be used to measure food safety standard compliance. This variable will indicate whether or not food service operators meet the food safety standard compliance level as stated in Food Act 1983 and Food Hygiene Regulations 2009 and thus assist the researcher to summarize on the food safety standard compliance level of the food service operators in Kedah.

2.11.3.2 Demographic Information as Variable

Age, highest education level, experience in food business industry, participation in food handling training, awareness on BeSS recognition, the importance of BeSS recognition and typhoid injection were among the items included under demographic information related to respondents. For the present study, the researcher indicated that some of this demographic information may influence respondents' perceptions and thus affects their food safety standard compliance level.

2.11.4 Theoretical Research Framework

According to Lederman and Lederman (2015), a theoretical research framework demonstrates an understanding and concepts that are relevant to research. It supports the theory of a research study. The scholars further explained that theoretical framework also used in explaining research data, linking research methodology, research questions and literature together. To conclude, a comprehensive theoretical framework is essential in every research study to assist the researcher in collecting all the necessary data prior to the research questions.

Knowledge, attitude, and practice (KAP) were identified as the three main variables concerned in the present study. These three variables were interrelated with each

other and the relations often described in the Theory of Planned Behaviour (TBP) and Knowledge, Attitude and Practice (KAP) model. The present study, however, adapted KAP model to explain the variables. As pointed out by Rennie (1995), a knowledge, attitude, and practice (KAP) model are one of the very useful theory which widely used in health education projects that evaluates the effectiveness of formal food hygiene education.

The theoretical framework of the present study was developed based on the perspectives presented in the previous literature reviews prior to food safety-related issues. The previous scholars suggested that the level of food safety knowledge among food service operators is positively associated with the level of food safety standard compliance (Zanin et al., 2017). Further, the framework also suggested that positive attitude conveyed by food service operators having a positive relationship with food safety standard compliance (Aziz & Dahan, 2013). Besides, Abdullahi et al., (2016) also claimed that good practices have positively affected food safety standard compliance.

Therefore, the present study demonstrated KAP model as theoretical research framework with the purpose to determine the true causes of food poisoning incidents occurred in 2013 that resulted in death which accessed on the knowledge, attitude, and practices pertaining to food safety among food service operators and thus concludes the level of food safety compliance in Kedah. The theoretical research framework in the present study comprised of the independent variables which consist of knowledge, attitude, and practice. Food safety standard compliance is the dependent variable of the present study whereby at the end of the research, the

findings should explain the relationship of the variables with food safety issues in Kedah. Therefore, the following Figure 2.7 illustrates the theoretical research framework of the present study.

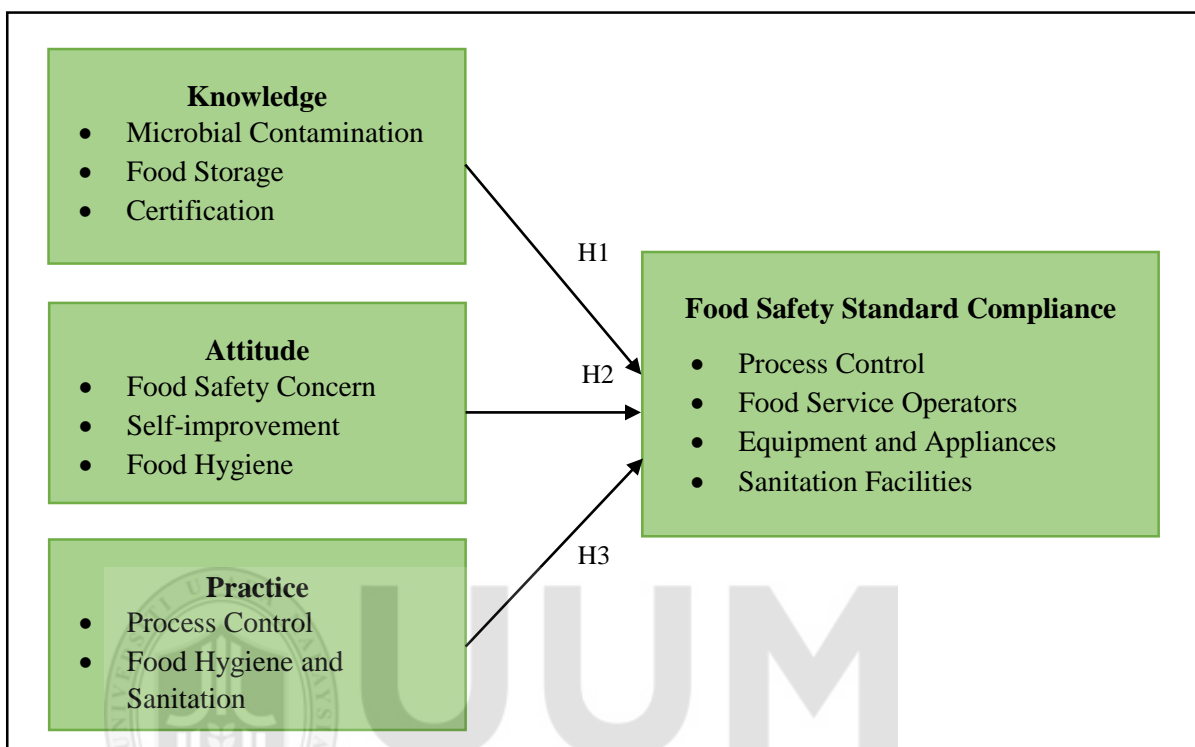


Figure 2.7: Theoretical Research Framework

2.12 Chapter Summary

The food handler training program devoted to food service operators supposedly assist food service operators to implement hygiene routine practices. However, the narrow benefits and knowledge sharing derived from training were the contributors to the ineffectiveness of the application of food safety practices both in premises and individuals. Despite all of the aggressive enforcement made by the government such as Food Act 1983, Food Hygiene Regulations 2009, GMP, GHP, HACCP, MeSTI, KENDIRI and BeSS recognition in making food safe, it is expected that food safety incidents will continue to rise gradually if there are no effort changes on food service

operators knowledge, attitude and practices in producing safe food. Thus, making foodborne illness prevention as a significant challenge in the coming years.

In conclusion, a series of the event must take place for food poisoning to occur. Foodborne illness incidence in Malaysia may just be the tip of an iceberg, with less exploration of the actual root cause. Therefore, an intensive hand-in-hand cooperation from every aspect including monitoring and surveillance from the public, government, lawmaker, academia, food manufacturers, industries, caterers, as well as research institutions are much needed to reduce the impact of foodborne diseases as a whole.



CHAPTER THREE

METHODOLOGY

3.1 Chapter Overview

By referring to Silverman (2013), research methodology is classified in distinct ways depends upon what the researcher is trying to investigate. It is the method used to achieve the objectives of the research and to answer research questions. Hence, this chapter discussed the detail explanation of data collection and analysis methods used throughout the research process. It covers the methodological aspect of the research that includes the research design, establishment of instruments, pilot studies, population and sampling techniques, data collection tools and instrument verification. Summary of research methodology and data analysis techniques specifies in the last section of this chapter.

On the other hand, variables are objects of observation in the form of diverse concepts that can be identified through a conceptual framework in research (Sekaran & Bougie, 2016). The variables used in this research are (1) level of food safety compliance in Kedah (dependent variable); (2) knowledge, attitude and hygiene practices of food service operators while handling food (independent variables).

The present study also seeks to answer the following research questions:

- RQ1: What has been the consequences of food poisoning incidence to the food business?
- RQ2: Who has the operational responsibility to ensure the food produced is safe for human consumption?

- RQ3: Why do the cases of food poisoning incidents keep increasing despite the establishment of Malaysian food safety standards?
- RQ4: Do the existing Malaysian food safety standards support/assist food service operators in conducting food preparation processes?
- RQ5: To what extent do food service operators comply with Malaysian food safety standards?

3.2 Research Propositions and Hypotheses Development

The important theories and concepts from the presented literature review have contributed to the development of propositions and hypotheses of the present study. The following subsection elaborates on the research propositions and hypotheses formulated in the present study.

3.2.1 Research Propositions

Propositions are qualitative nature. Qualitative propositions are similar to research hypotheses in quantitative studies whereby hypotheses focused on examining the relationship between two or more variables (Zikmund, 2013). On the other hand, propositions in qualitative studies focused on answering questions involving how or why. It deals with the connection between two existing concepts.

The following propositions in Table 3.1 are proposed based on the research questions derived from the previous chapters. As the present study employs both qualitative and quantitative research methods, the research propositions were formulated for RQ1, RQ2, RQ3, and RQ4 to have a better understanding on the increments of food poisoning cases despite on the well-established Malaysian food safety standards and how these standards affect food service operators' in food production processes at the premise. These four propositions will be answered based on a series of semi-

structured interviews as well as case study with experts from the Food Safety and Quality Division, Ministry of Health Malaysia whom directly involved with the phenomenon being studied.

Table 3.1: Formulation of Propositions

	Research Questions	Propositions
RQ1:	What has been the consequences of food poisoning incidence to the food business?	There are several impacts of food poisoning incidence to the food business.
RQ2:	Who has the operational responsibility to ensure the food produced is safe for human consumption?	Food service operators hold the operational responsibility in making sure the food produced is safe for human consumption.
RQ3:	Why do the cases of food poisoning incidents keep increasing despite the establishment of Malaysian food safety standards?	The unfavourable attitude of food service operators that contribute to food poisoning incidents.
RQ4:	Do the existing Malaysian food safety standards support/assist food service operators in conducting food preparation processes?	Malaysian food safety standards is comprehensive that it should be assisting food service operators in daily business operation.

3.2.2 Research Hypotheses

A hypothesis is a proposed solution or prediction statement to a particular scenario (Kaur, 2017). It can be verified based on observation or experience which will give the answer to the research question. The hypothesis is testable to be true or false through the research study. In essence, there are two key components to form a hypothesis with are dependent and independent variables. The independent variables of the present study are knowledge, attitude, and practice of food service operators whereas food safety standard compliance is the dependent variable of the present

study. The following subsection outlined the relationship between the construct of the study and the relationship between both of the variables.

3.2.2.1 The Relationship between Food Service Operators' Knowledge and Food Safety Standard Compliance

Previous studies have revealed that the level of food safety knowledge among food service operators on safe food handling becomes the determinant of the cleanliness and safety of the food provided at the premises (Akabanda, Hlortsi & Owusu-Kwarteng, 2017; Rahman, Arif, Bakar & Talib, 2016). Results from both studies revealed that knowledgeable food service operators are predictors towards safe food handling as it helps to minimize the risk of food poisoning cases in Malaysia by always producing safe and hygienic foods. Thus, comply with the Malaysian food safety standards.

The level of food service operators' knowledge of handling food can be enhanced by attending food handling courses (Murphy, DiPietro, Kock & Lee, 2011). This statement has been supported by Kamal, Hassim, and Mahmood (2015) who agreed that producing knowledgeable food service operators is a basic food hygiene practice which in line with the requirement of Malaysian food regulations. In accordance with Food Act 1983, it is mandatory for all food service operators to attend and complete the courses at least once to provide exposure and build awareness of the importance of providing clean and safe food products among all food industry players in the food industry.

However, hiring incompetent food service operators with low food safety knowledge carries the potential risk of foodborne illness (Smigic et al., 2016). In conclusion, knowledge is an important factor in determining a person's attitude as well as actual behaviour. Therefore, there is a relationship between food service operators' knowledge and food safety standard compliance. Based on the above discussion, the following hypothesis is developed.

Hypothesis 1: There is a significant relationship between food service operators' knowledge and food safety standard compliance.

3.2.2.2 The Relationship between Food Service Operators' Attitude and Food Safety Standard Compliance

Previous studies indicated that there is a significant relationship between the attitude of food service operators towards food safety and food safety standard compliance. As mentioned by Sino, Mahadi, Haron, Misrin and Mustapa (2013) and Siau et al., (2015) both authors agreed that a positive attitude practiced by food service operators in handling food leads to clean and safe food consumption. The study has also been supported by Akabanda et al., (2017) who expressed that the risk of serving contaminated food can be reduced to the lowest possible with a positive attitude during food preparation processes.

In contrast, Zanin et al., (2017) revealed that the attitude of food service operators who neglected food hygiene while handling foods might expose the consumers to the risk of food contaminations. As a result, foodborne pathogens were spread and incurred food poisoning incidents. This is because food service operators carry the

whole responsibility in ensuring food safety and prevent food poisoning at the entire production line (Lee, Abdul Halim, Thong & Chai, 2017). In essence, food service operators should provide varieties of nutritious foods for the physical, emotional, spiritual and intellectual development of human beings.

To conclude, the favourable attitude among food service operators would improve the status of food produced, guarantees the hygiene level of food products, and thus improve the food safety standard compliance level. Therefore, the present study proposes the following hypothesis.

Hypothesis 2: There is a significant relationship between food service operators' attitude and food safety standard compliance.

3.2.2.3 The Relationship between Food Service Operators' Hygiene Practices and Food Safety Standard Compliance

The relationship between food service operators' hygiene practices toward food safety standard compliance could be traced in the present study. As noted by Park, Kwak, and Chang (2010), improper food preparation practice can be fatal because it leads to microbial contamination of food produced. Food service operators' failure in practicing a basic rule of food preparation and neglecting personal hygiene, might become the vehicle for microorganisms to spread through the mouth, hand and skin which resulted in foodborne illness (Ismail, Chik, Muhammad & Yusoff, 2016).

However, food poisoning hazards can be greatly reduced through appropriate food preparation techniques. Washing hands regularly, good sanitation and avoid direct

contact between raw and ready-to-eat foods are some of the good practices that can be applied by food service operators to keep away from foodborne pathogens contamination. Therefore, the risk of serving contaminated food can be avoided. Based on the above discussion, the following hypothesis is proposed.

Hypothesis 3: There is a significant relationship between food service operators' hygiene practices and food safety standard compliance.

3.3 Research Design

A research design is a synonym with a set of blueprints used to represent methods used in the conducted research. It covers data types, procedures and data collection tools, types of analysis techniques and also the selection of data collection areas that are relevant to the research problem (Yin, 2013). As mentioned by Sekaran and Buogie (2016), appropriate procedures taken will greatly provide a value-added to the research finding. The following subsection will further explain the research design employed in the present study to answer all of the research questions.

3.3.1 Mixed Method

Based on the research objectives presented earlier in chapter one, the present study aims to explore the main causes of frequent food safety incidents in Kedah by applying the knowledge, attitudes, and practices (KAP) model, on selected food service operators in regards to their food safety and hygiene practices while handling food. Besides that, the researcher also aims to identify which of these three traits triggers the occurrence of food poisoning episodes in Kedah and finally able to determine the food safety standard compliance level of the food service operators. To

the researcher's knowledge, this is the first study that attempts to evaluate the effectiveness of Malaysian food safety standards and regulation on food service operators and how these standards affect food service operators' in food production processes at the premise. Therefore, the present study employs exploratory research that utilizes both qualitative and quantitative research methods with the means to answer the research objectives.

According to McNabb (2015), research comes in three types which identified as exploratory, descriptive or causal / explanatory research. However, the selection of research design depends on the aims of the study conducted. Exploratory research is research that explores subjects with little knowledge prior to the research. At the end of the findings, exploratory research will form a basis for future research. As a result, exploratory research is usually in a form of qualitative because the research is still at an exploratory phase and quantitative methods are usually not yet applicable at this point (Zhang, 2015).

Exploratory research gathers data from a qualitative approached which includes an informal and formal approach. An informal approach includes a discussion with consumers, employees or competitors, whereas formal approaches may come through in-depth interviews and case studies. In essence, exploratory research is conducted when there are a few or no studies to refer to while the researcher has observed something that needs more understanding of that particular phenomenon (Sekaran & Bougie, 2016). Thus, exploratory research serves the purpose to investigate the research problem in the present study with more concrete evidence.

Referring to McKim (2017), studies that employ both qualitative and quantitative approaches will gain a broader understanding and value-added on the phenomenon studied compared to studies with one design approach. A mixed-method research design also allows the researcher to retrieve the information that cannot be answered by either qualitative or quantitative approaches alone (Creswell & Clark, 2011). As a result, the combination of mixed-method conducted in the present study hoped to strengthen the weaknesses of each research design when performed individually.

Before conducting the mixed-method research, a research framework will be first developed from the extensive literature review. Next, a research instrument will be formulated based on the information gathered as a preparation to conduct a pilot study. Finally, variables that determine the research questions will be identified and used to develop both semi-structured interviews and self-administered questionnaire survey that will be conducted during the data collection method in the present study.

The present study conducted a quantitative study as complementary to the qualitative research findings (Creswell & Clark, 2011). The present study applied the qualitative method at the first stage of data collection process to obtain answers to the exploratory data on the impact of food poisoning incidence to the business, who has the operational responsibility to ensure the food produced is safe for human consumption, factors that contribute to food poisoning cases in Malaysia even with a comprehensive Malaysian food safety standards and to what extent does it assist food service operators in daily business operations. This is due to the fact that food service operators hold a very important factor that contributed to food poisoning cases. Thus,

the researcher will firstly conduct the research qualitatively, followed by quantitative stage in order to confirm the findings from the qualitative phase.

By referring to Hancock, Ockleford, and Windridge (2001), by conducting research qualitatively, the researcher is capable to retrieve information in the form of opinion and views based on the respondent experience. In this way, the researcher will gain a deeper insight into the studied phenomenon as detailed and rich descriptions will be provided by the respondents.

The second stage of the data collection phase will be done quantitatively to gather information prior to research questions that can be obtained in numerical form, which is applicable for RQ5. Findings from Hair et al., (1998) exposed that numerical findings were more concrete and reliable data. The research findings can assist in research in validating relationships and hypotheses testing depending on research problems and research objectives. The combination from both qualitative and quantitative data will give a new research finding, provide additional values and reliable outcomes for the final research results. To conclude, the combined results from both methods able to assist the researcher in answering all of the research questions and thus achieving the research objectives.

3.4 Data Collection Methods

Data collection methods determine how the data will be collected and means of gathering it since meaningful data will provide answers to the research objective (Harun & Abdullah, 2004). The methods in gathering data are fairly important to

explain the research objectives because the retrieved data will ensure the success or failure of one's research.

3.4.1 Qualitative Data Collection Methods

Qualitative data usually derived from sources such as interviews, focus groups, observation on real-life settings and existing documents. Research may include one, or a combination of several resources depending on the research context. However, the present study utilized data that were sourced from both primary and secondary data.

3.4.1.1 Primary Data

Primary data can be classified as data that were observed or collected directly from the first-hand experience either through field investigations, observations, site visits, or in-depth interviews (Harun & Abdullah, 2004). By referring to the primary goal of the research, the researcher felt it is best to conduct the present study through an in-depth interview approach as more details regarding the issues will be gathered through interviews. This is also in line with a study done by Mason (2010), who stated that an interview method is the best practice for field investigation to obtain complex information as it is difficult to measure beliefs, thinking and enthusiasm.

In the present study, the researcher will be asking questions that have been prepared earlier, however, the questions were flexible depending on the real interview session held on-site. Two (2) key respondents from the Kedah State Health Officer will be selected and interviewed due to their knowledge and experience in both operations and top management decision making in the food industry. All interviews will be

held on-site. The interview session will be held for 45 minutes to an hour, on average, and the session ended when there is no new information gathered, or when the information has reached the saturation point (Baker, Edwards & Doidge, 2012). The confidentiality of all of the interviewees will be maintained throughout the present study. However, the participation of respondents is voluntary and bias-free.

3.4.1.2 Secondary Data

Any written materials published such as books, journals, articles, and reports fall under secondary data as claimed by Harun and Abdullah (2004). In order to conduct a successful qualitative case study research, the researcher refers to multiple sources of reading materials such as published journals, articles, newspapers, reference books, internet sources and reports as supplementary to the primary data and thus helps to achieve the research objectives. Objectivity and comprehensiveness of the research were mainly derived from the Food Safety and Quality Division, Ministry of Health Malaysia's official website and also published reports pertaining to the related study as the main sources of secondary data.

3.4.2 Quantitative Data Collection Method - Primary Data

In comparison to secondary data, primary data deals with original data sourced by the researcher. Primary data usually obtained and analysed first-handed through several methods such as interviews either through phone or personally, distributing out questionnaires and observation. The present study performed a self-administered questionnaire survey as the means of quantitative data collection methods. The reason for selecting self-administered questionnaire survey because it gives the respondents an opportunity to freely fill out the questionnaire by themselves without

any influence or involvement by the researcher. Besides, this approach also provides a better outcome in terms of answering questions which will be beneficial to the research result.

3.5 Research Materials and Methods

There were few steps taken in order to conduct the present study, including systematically reviewing the relevant studies as the research subject. This reviewing process started with food safety incidents that occurred in August 2012 up till Mei 2019.

In order to identify relevant articles subjected to food safety incidents in Malaysia, a list of databases such as EBSCO, Emerald, Science Direct, and SCOPUS was conducted in Google, and the keywords for inquiring those articles include “food safety incidents in Malaysia”, “KAP models”, “factors affecting food safety incidents in Malaysia”, “foodborne illness in Malaysia”, “food handlers attitude towards safe food handling”, “sanitation practises among food handlers”, “food safety knowledge, attitudes, and practices of food handlers”, “food handlers hygiene knowledge”, “evaluation of KAP models on food safety among food handlers in Malaysia”, and keyword that related to the present study.

This process of retrieving articles was repeated until the point of saturation has been reached. This situation is similar to a scholar, Randolph (2009), who suggested that the references of the retrieved articles were repeatedly searched until a point of saturation was reached. On the other hand, Hart (1998), proposed to narrow down the articles based on the inclusion formed to match the focus of the research paper by

following the review guidelines. By referring to the above elaboration, a total of 600 articles reviewed, 50 conference proceedings, and 50 government reports were revealed. However, from the total papers reviewed, only 350 articles were found relevant to the research topic.

3.6 Operational Definition

An operational definition defining a concept in terms of how the researcher plan to measure that concept in the present study. It is a statement that specifies the procedures used to measure a variable. An operational definition is a crucial starting point for any scientific study. The variables, dimensions and total number of items used to measure the variables were elaborated in details in the following subsections.

3.6.1 Dependent Variable

A dependent variable is defined as an outcome of the research. In the present study, it is the interest of the researcher to measure the level of food safety standard compliance in Kedah. Food safety compliance is a set of enforcement activities and general principles undertaken by the Food Safety and Quality Division, Ministry of Health Malaysia, to ensure safe food consumption. This is because the threat of foodborne illness has resulted in the implementation of strict food safety standards.

The heart of all food control activities underlies the establishment of safety, quality and labelling standards. Therefore, the main legislation regulating food safety in Malaysia is the Food Act 1983 (Philip, 2015). Food Act 1983, with the complementary of Food Hygiene Regulations 2009 that were gazetted in October

1985 aims to protect the public against food-related hazards and frauds, as well as to promote and motivate on the preparation, handling and distribution channel.

The operationalization of food safety standard compliance level was measured by 1) Process Control, 2) Food Service Operators, 3) Equipment and Appliances and 4) Sanitation Facilities. Thus, this section measured to what extent that food service operators comply with all the underlined food safety measures by the Food Safety and Quality Division, Ministry of Health Malaysia to maintain food safety.

Nonetheless, food safety standard compliance is vital as it provides meaningful protection against food hazards. Bear in mind that any safety standards developed have real cost for the government, industry as well as the consumers. The failure to adhere to the standards set will surely impose a great loss on the country and most importantly endangering human life if consuming contaminated food products. Besides that, the food industry needs a standard that permits flexibility and efficiency in producing and marketing food that better serves potential customers. Thus, food industry players carry a huge responsibility in making sure these standards were worth it.

3.6.2 Independent Variables

An independent variable is a variable that is manipulated or controlled in a study. It was applied to test the effects on the dependent variable. The independent variables of the present study comprised of 1) Knowledge, 2) Attitude and 3) Practice (KAP). All of these variables were derived from KAP model that used widely to gather information on what does the respondents know (knowledge), how do the

respondents feel about a subject matter (attitude) and what were they practicing (practice). These factors were often the source of misconceptions or misunderstandings that may represent obstacles to the activities that the researcher would like to implement and potential barriers to any behavioural changes.

Knowledge in the food industry is health power. Any food service operators who involved in food business should at least have these two most important basic aspect; which is skills and knowledge. By having both the food safety skills and knowledge, food service operators were able to maintain safe food production for the benefits of society as a whole. Besides, knowledge fostered indirectly will affect a positive attitude and practices.

Attitude, on the other hand, refers to a set of thinking, behaviour or feeling about a certain matter. The food service operator's attitude is an important aspect of food businesses. This is because most of the reported foodborne outbreaks occur due to unfavourable attitude demonstrated by food service operators while in the kitchen (Zanin et al., 2017).

Lastly, hygiene practices among food service operators also an important key factor in ensuring safe food production. Both pieces of research by Baluka, Miller, and Kannene (2015), Faour-Klingbeil, Kuri, and Todd (2015) highlighted that lack of food service operators' personal hygiene often significant to the risk contribution of food-related hazards in food businesses. Therefore, these three variables will be controlled to measure the outcome of the dependent variable for the present study.

3.7 Measurement of Instrumentation

All of the variables in the present study were measured by multiple items drawn from various sources from the previous research including semi-structured interviews and self-administered questionnaire surveys. Both qualitative and quantitative research design was employed in the present study as it provides several advantages including providing strengths that offset the weaknesses of both qualitative and quantitative research.

At the starting of the data collection phase, a research instrument will be first developed based on the modification of an earlier instrument, used by previous researchers. However, only sources that addressed the triad knowledge, attitudes and practices of food service operators in regards to food safety were included in this review.

3.7.1 Research Instruments – Qualitative Approach

A semi-structured interview design found to be the most common method for obtaining information in qualitative studies as according to Creswell (2013). Boyce and Neale (2006) defined semi-structured interviews as a technique that involves an intensive individual interview involving a small number of respondents to explore their perspectives on a particular idea, situation or phenomenon of the study setting. Meanwhile, Cohen and Crabtree (2006) describe a semi-structured interview as a type of interview that is informal and runs by following a guide. Based on the researcher, semi-structured interviews usually contain the components of both structured and unstructured interviews. In semi-structured interviews, the researcher will prepare a rigorous set of questions that do not allow the respondents to divert

from the themes. Simultaneously, the researcher might ask additional questions to further clarify the issues explored if necessary.

A semi-structured interview approach was employed in the present study with the primary goal to explore the impact of food poisoning incidence to the business, who has the operational responsibility to ensure the food produced is safe for human consumption, factors that trigger food poisoning cases in Malaysia and how far does Malaysian food safety standards affect food service operators' daily production routine and thus concludes the level of food safety standard compliance in Kedah.

The semi-structured interviews were carried out to two (2) food industry experts. A set of an interview checklist and an interview guide were prepared in advance to help the researcher to stay focus and tailored questions to the interview context. This method offers a balance between the flexibility of an open-ended interview and focused on the production of rich data. Besides, a semi-structured interview is often allowing new ideas to be brought up during the interview session, as a result, to correspond to the asked questions. Thus, semi-structured interviews were used as the main data collection method for qualitative investigation.

3.7.1.1 Case Study

A case study is a way of approaching a research topic. It can integrate both qualitative and quantitative information. However, a case study was focused on qualitative information to give an in-depth picture of the issue being studied (Stake, 1995). As Stake (1995), explained, a case study is defined as a method for

developing a complete understanding of a process, program, event, problem, or activity. It is an in-depth and extended example that is used to illustrate an argument. A case study research excels at providing a deeper understanding of a complex issue or adds strength to what is already known through previous research (Denzin & Lincoln, 2011). It emphasizes detailed contextual analysis of a limited number of events or conditions and their relationships. Another researcher, Merriam (1998), defines case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used. That is why any case study research gives an advantage to one another where some people do not have an effective experience compared with others who do (Yin, 2003).

In the present study, a case study was designed to evaluate the proposed research framework. A single case study approach was selected under several circumstances which particularly based on the similar food safety incidents that occur repeatedly in Malaysia that require to be analysed and improved. However, only one severe food poisoning incidents happened in 2013, that took place in Kampung Huma, Tanjung Dawai, Sungai Petani, Kedah has been selected for the case study. This is because, amongst all of the food safety issues that occurred in Malaysia, this one was affected the most, and has had the biggest impact on the community with four (4) death victims prior to the incidents.

By referring to Yin (2003), a single case study design is most appropriate to conduct a crucial cases, which is very similar to the present case study conducted - to explore

the main causes of frequent food safety incidents which lead to death in 2013, aiming the affected food service operators in Kedah, that assessed the knowledge, attitudes, and practices (KAP) in regards of food safety and hygiene practices while handling food, how far does Malaysian food safety standard affect food service operators' daily production routine and thus concludes the level of food safety standard compliance in Kedah. Hence, the severity of food safety incidents' uniqueness qualifies as a single case study as recommended by Yin (2003).

3.7.1.2 Semi-Structured Interview Design

Through this methodology, qualitative information is gathered from semi-structured interview sessions and relevant documentation. Interviews were best implemented in conducting case studies, which coincide with Miles, Huberman, Huberman and Huberman (1994) point of view who stated that data provided from this method provides more accurate and reliable data. Interviews, on the other hand, assist to explore one's in-depth justification and were free to express their ideas.

The instruments also allow the respondents the freedom to express their views in their own terms. Through the interviews, the respondents can express their opinion and views freely based on their experience as they are not being assessed. Besides that, there were no correct or wrong answers to the responded questions. On top of that, a semi-structured interview design allows the researcher to prepare the questions or interview guides beforehand. This enhances the effectiveness of conducting the interview session since the interviewer comes prepared and guided and will finally conduct the interview smoothly (Cohen & Crabtree, 2006). As a

result, this research method has the advantage of the richness of data comparable to quantitative data.

In regards to the semi-structured interview items, all of the interview questions were supplemented by materials from the previously tested questionnaires that focused mainly on the knowledge, attitudes, and practices (KAP) model of food service operators regarding food safety and hygiene practices while handling food. The questions for the semi-structured interview were divided into two (2) parts. The first part includes general open-ended questions to become familiar with the interviewees, whereas, in the second part, interviewees will be asked in-depth on the impact of food poisoning incidence to the business, who has the operational responsibility to ensure the food produced is safe for human consumption, factors that trigger food safety incidents in Malaysia by using the knowledge, attitudes, and practices (KAP) model, how far does Malaysian food safety standard affect food service operators' daily production routine and thus concludes the level of food safety standard compliance in Kedah. The interviews were conducted between September – October 2017 in Kedah, where the affected premise was located.

3.7.1.3 Semi-Structured Interview Approach

A semi-structured interview approach was chosen with the objective to discover a subject matter in a free mode situation, besides allowing the interviewees to put across their opinions and ideas in their own words regarding what they have experienced (Dodge, 2011). On the other hand, the researcher needs to pay careful attention to the participants' replies and to follow their direction using the supplemented interview questions. In addition, the phrasing of questions can be

changed, the explanation given and for some interviewees, where applicable, some questions can either be omitted or added to the interview.

As for the semi-structured interview process, the interviewees will be first contacted through emails and phone calls in order to set up an appointment and thus explain in regards to the research purpose, research procedure and the expected outcomes from the present study. Meanwhile, the interviewees are freely welcome to participate as a part of the research subject and were ensured the protection of confidentiality. In addition, all interview sessions will be held on-site as agreed with Jepsen and Rodwell (2008), who mentioned that a good interview practice is always carried out within the respondents' general work area. Next, all of the interviews will be recorded in order to ensure that no information lost, transcribed and verified by the respondents. The main topics will always be reminded as guidance while allowing any questions that might originate from the main questions. Upon agreement, all of the participants will be notified regarding the time and date of the interview session.

3.7.1.4 Semi-Structured Interview Checklist

A semi-structured interview checklist consists of a list of preparations prior to the interview, during the interview and also after the interview (Kajornboon, 2005). The checklist is an important instrument for the interview as it provides a list of important actions, such as forms and relevant documents as well as equipment which are essential to the interview session (Whiting, 2008). Besides, the checklist ensures that all the needed materials and instruments for the interview session are available and in good condition, thus smoothen the interview session by reducing any chances of error while conducting the interview (Wengraf, 2001). (Please refer to Appendix A).

3.7.1.5 Semi-Structured Interview Guide

A semi-structured interview guide served as a guide for the interview. It was prepared by the researcher beforehand based on the research objectives of the present study. The formulation of semi-structured interview questions in the present case study research was based on Roulston (2010) guidelines. (Please refer to Appendix B).

3.7.2 Research Instruments – Quantitative Approach

According to Kothari (2004), quantitative methods were more geared towards collecting and finding numerical data using structured and systematic methods. The data were then analysed using statistical techniques and maintained the degree of objectivity in the interpretation of the investigation (Tashakkori & Newman, 2010). The researcher implemented this approach in the present study with the purpose to provide a concrete and definite answer to research questions that complement the qualitative result.

As mentioned earlier, both qualitative and quantitative instruments were executed in collecting data for the present study. As for the quantitative approach, a self-administered questionnaire survey was designed from the adaption of KAP model from previous studies. A questionnaire can be adapted from the previous studies to form a new set of questions that were parallel to the present study as long as the questions were relevant in obtaining the research questions (Tsang, Royce & Terkawi, 2017). Besides, the adapted questionnaires also required to use the language which is understandable by the respondents. Finally, the adaptation of an existing questionnaire for a new study setting is allowed as it enables the respondents

to accept it culturally. However, the adaptation of the questionnaire must not change the overall meaning and most importantly, the initial aims of the questionnaire as noted by Tsang, Royce and Terkawi (2017).

3.7.2.1 Questionnaire Development

A set of written questionnaires was developed based on the questions adapted from previous studies concerning KAP model, food service operators as well as food safety checklist based on the Malaysian Food Act 1983. (Please refer Appendix D).

The questionnaire consists of five (5) parts: demographic profile of respondents (11 questions); food safety standard compliance (13 questions); food safety knowledge (12 questions); attitude of food service operators towards food safety (12 questions); and food handling practices (8 questions). Table 3.2 summarizes the variables, dimensions and total number of items that were adapted for the modified version of the self-administered questionnaire survey that suits the research objectives for the present study.

Table 3.2: Summary of Variables, Dimensions and Number of Items

Variable	Variables Measured	Dimensions	No. of Items
DV	Food Safety Standard Compliance Food Act 1983, Food Hygiene Regulations 2009	Process control	30
		Food service operators	30
		Equipment and appliances	30
		Sanitation facilities	30
IV	Knowledge Low et al., (2016), Ko, (2013); Abdul-Mutalib et al., (2012); Soares et al., (2012).	Microbial contamination	25
		Food storage	8
		Certification	5

Table 3.2: Summary of Variables, Dimensions and Number of Items
(Continue)

Variable	Variables Measured	Dimensions	No. of Items
Attitude			
IV	Low et al., (2016);	Food hygiene and sanitation	13
	Ko, (2013);	Self-improvement	4
	Sanlier and Konaklioglu, (2012); Soares et al., (2012); Abdul-Mutalib et al., (2012).	Food safety concern	4
Practice			
IV	Ko, W. H. (2013); Saad et al., (2013); Abdul-Mutalib et al., (2012).	Process control	16

The following subsection explained the adapted items used in the present study as a research questionnaire. The five-point Likert scale ranges from “1=strongly disagree” to “5=strongly agree” were used to measure all the items to ensure consistency.

3.7.2.1.1 Food Safety Standard Compliance

The researcher intended to explore how much the independent variable had impacted the dependent variable. Therefore, food safety standard compliance is the dependent variable in the present study. Food safety standard compliance was measured by process control, food service operators, equipment and appliances, and sanitation facilities as shown in Table 3.3. There were thirteen items to measure food safety standard compliance in total. All of these items were supplemented from the Food Act 1983 and Food Hygiene Regulations 2009 guidelines concerning safe food handling and food service operators. The items in this section were measured through five-point Likert scales ranging from 1=strongly disagree to 5=strongly agree. The

respondents were asked to rate their current food premises status prior to the level of food safety standard compliance.

Table 3.3: Items to Measure Food Safety Standard Compliance

Dimension	Question No.	Items
Process control	2	Knowing the temperature of the refrigerator is important to reduce the risk of food damage.
	4	The safe temperature for cooked food is $>63^{\circ}\text{C}$ for hot dishes and $<-5^{\circ}\text{C}$ for frozen foods.
	8	Food preparation in advance before the actual serving time increases the risk of food poisoning.
	13	The purchases of raw materials that is displayed together with chemicals should be avoided.
Food service operators	1	Food service operators are responsible for getting an anti-typhoid vaccine to control the spread of typhoid fever.
	3	The use of hat, face mask, protective gloves and a proper clothing while handling food can reduce the risk of food poisoning.
	10	The use of hat, face mask, protective gloves and a proper clothing while handling food can reduce the risk of food poisoning.
	11	The use of any kinds of jewellery should be avoided when preparing food.
Equipment and appliances	6	Wiping cloth is always in a clean state.
	7	The environment and food storage equipment is in a clean condition.
	9	Using a knife and different cutting boards when preparing wet and dry ingredients
Sanitation facilities	5	Pest control devices are working and in a good condition.
	12	Adequate amount of garbage bins provided and covered trash bins.

Source: Adapted from Food Act 1983 and Food Hygiene Regulations 2009

3.7.2.1.1.1 Quantitative Measurement of Food Safety Standard Compliance

The Food Safety and Quality Division, Ministry of Health Malaysia is responsible for ensuring the safety and quality of food through the Food Safety and Quality Program for all states in Malaysia. This is in accordance with the provisions, procedures and codes of practice established under the Food Act 1983 and the Food Regulations 1985, Food Hygiene Regulations 2009 and Food Regulations 2009.

This unit is responsible for ensuring the implementation of all government policies and strategies of the Ministry of Health in relation to industry, certification and food safety education to industry and consumers. Besides, this unit also in charge of the promotion of food safety, advisory services to the food industry, consumer education, food inspection and sampling, analysis and enforcement.

The quantitative measurement of food safety standard compliance in the present study were measured through the combination of Food Act 1983, Food Premise Inspection and Grading Checklist, and feedback received by the officers' in charge. Basically, there were two methods of calculating scores based on the type of food premises being inspected. Firstly, by scoring all of the elements in the checklist, or secondly, only consider on the relevant components during inspection. (Please refer Appendix C). Finally, a completed form will be endorsed by the Examining Officers and approved by premise owners at the end of the inspection and grading activities.

3.7.2.1.2 Knowledge

Knowledge of food service operators towards maintaining safe food production was measured using the measurements adapted from Low et al., (2016); Ko, (2013);

Abdul-Mutalib et al., (2012) and Soares et al., (2012), that gives the Cronbach Alpha values between 0.712 ~ 0.832. The items used to measure food service operators' knowledge are shown in Table 3.4 as below.

Table 3.4: Items to Measure Knowledge

Dimension	Question No.	Items
Microbial contamination	1	Bacterial contamination occurred because of the wrong selection of raw materials.
	2	Bacterial contamination occurred because of the improper ways of food storage.
	3	Bacterial contamination occurred because of the improper ways of food preparation.
	4	Bacterial contamination occurred because of the attitude of food service operators' who ignores food safety while preparing food
	5	Food contamination can occur at any stage of the food handling process.
	6	Cross contamination is a major factor contributing to food poisoning. <i>*Cross contamination is a physical movement or the transfer of harmful bacteria from one person, an object or place to another.</i>
	7	Typhoid disease (typhoid fever) is spread through foods and drinks that have been contaminated by faeces.
Certification	12	Foods that were heated repeatedly increase the risk of food contamination.
	8	Typhoid disease (typhoid fever) is spread through foods and drinks that have been contaminated by faeces.

Table 3.4: Items to Measure Knowledge
(Continue)

Dimension	Question No.	Items
Food storage	9	Selection of fresh raw materials will leads to a healthy food that safe to be eaten.
	10	Improper food storage can be harmful to consumers.
	11	Cooked foods should be kept separately from raw materials.

Source: Adapted from Low et al., (2016); Ko, (2013); Abdul-Mutalib et al., (2012) and Soares et al., (2012).

3.7.2.1.3 Attitude

In the present study, food service operators' attitude in food safety were measured using measurements adapted from Low et al., (2016); Ko, (2013); Sanlier and Konaklioglu, (2012); Soares et al., (2012) and Abdul-Mutalib et al., (2012). All of these measurements had a scale of reliability between 0.735 ~ 0.882. The items used to measure the attitude of food service operators in food handling practices were shown in Table 3.5 below.

Table 3.5: Items to Measure Attitude

Dimension	Question No.	Items
Food hygiene and sanitation	4	I think that it is okay to touch exposed food with bare hands.
	6	I always use the same wiping towel to clean the counters and also cooking utensils.
	7	I think wearing jewellerys when preparing food is not an issue.
	8	I often ignore my self-appearance during my working time.
Self-improvement	3	I will read more information on food safety to improve my food safety knowledge.

Table 3.5: Items to Measure Attitude
(Continue)

Dimension	Question No.	Items
Food safety concern	1	I think cooking food thoroughly ensures food safety.
	2	I think food safety is always more important than taste.
	5	I will keep on preparing food even though I am in an unhealthy condition.
	9	I will choose the processed foods in unopened packaging.
	10	I always thaw frozen foods repeatedly.
	11	I always store the leftovers in the refrigerator very close to one another to make space.
	12	I always cut the raw materials to the appropriate size to speed up the cooking process.

Source: Adapted from Low et al., (2016); Ko, (2013); Sanlier and Konaklioglu, (2012); Soares et al., (2012) and Abdul-Mutalib et al., (2012).

3.7.2.1.4 Practice

The last section of the questionnaire survey assessed the food service operators' hygiene practices in reducing the risk of food contamination. The reliability scale for the adapted measurements ranged between 0.710 and 0.887, and was supplemented from Ko, (2013); Saad et al., (2013) and Abdul-Mutalib et al., (2012). The items used to measure hygiene practice of food service operators are shown in Table 3.6.

Table 3.6: Items to Measure Practices

Dimension	Question No.	Items
Process control	1	I During the food preparation process, I always choose fresh raw ingredients.
	2	I will use the expiry date as a guide to determine the safety of the food.
	3	I am responsible for separating raw foods and cooked foods in different spaces.
	4	I will ensure that raw materials such as meat and fish kept in a freezer as soon as possible after cleaning to prevent damage.
	5	I always leave frozen food (frozen) thawed at room temperature before using them.
	6	I stored leftovers in the refrigerator for more than five (5) days
	7	I always store all perishable foods in the refrigerator after my shift ends.
	8	I will keep the trash cans closed at all time.

Source: Adapted from Ko, (2013); Saad et al., (2013) and Abdul-Mutalib et al., (2012).

Besides, a screening questions prior to the research objectives were also included at the beginning of the questionnaire in ensuring the respondents' awareness on the existence of BeSS recognition in the food industry, since the present study was conducted to determine whether the Malaysian food safety standard assist food service operators in the daily food business. Therefore, to ensure the homogeneity of respondents, the mentioned screening question was included. Along with the screened questions, demographic information was captured as well. This includes respondents' gender, religion, age, education level, and experience in the food industry. Questions pertaining to typhoid injection and food safety training courses were also supplemented.

To conclude, the modified version of self-administered questionnaire survey for the present study was adapted from the mentioned authors in the above subsections because among all the questionnaire that has been reviewed from the past research, these selected ones gave the best Cronbach's alpha values of 0.965, 0.713 and 0.696 respectively for food service operators' knowledge, attitude, and practices in regards of food safety and hygiene practices while handling food. The entire group of items in the questionnaire exceeded the value of 0.7 which signifies that they have acceptable internal consistency reliability.

Apart from that, a Bahasa Melayu version for all of the items has also been included in the modified version of the self-administered questionnaire survey to ensure better understanding by the respondents thus assists them to answer all of the given questions. However, the modification of the items did not change the overall meaning and construction from the adapted questionnaire. Thus the reliability of the construct for each group of items is still similar to the original version which is 0.7 Cronbach alpha value. The adapted version of the questionnaire used in the present study consists of three (3) groups of items that were capable of measuring KAP model of food service operators and one (1) group of items to evaluate the level of food safety standard compliance in Kedah. The actual questionnaire survey used in the present study were attached in Appendix D.

In conclusion, both of the instruments were essential in gathering data in the present study with the aims of answering all of the research questions and also to reach all of the research objectives.

3.7.2.2 Self-Administered Questionnaire Survey Approach

The second phase of a data collection method in the present study was done through a self-administered questionnaire survey approach. This method was conducted to have a better interpretation of the level of food safety practices by using KAP model and to measure food safety standard compliance in Kedah.

In regards to the questionnaire distribution method, the researcher personally sent and collected all the distributed questionnaires in Kedah's district including Kulim, Sungai Petani, Gurun, Yan, Alor Setar, Jitra, Kubang Pasu, Changlun, and Sintok. The researcher left the questionnaire at the respondents' food premises for two (2) days before collected it back from them. By doing this, it also provides time and comfort for respondents to answer the questionnaire comfortably. The questionnaire was completed by respondents who dealt with food handling and preparation at the food premises.

On top of that, the participation of respondents in the present study was based on a voluntary basis and the subject was free to withdraw at any time without any penalty imposed. Besides that, the respondents were also informed that their responses would be anonymous and confidential and all of the answered questionnaires would totally remain with the researcher.

In order to avoid confusion among respondents, all items were measured using a five-point Likert scale to ensure consistency. Oppenheim (1992) recommended a five-point scale for social science study as the reliability of the five-point scale is good and permits a greater range of answers to respondents. As a result, a five-point

scale seems better since it has a middle point. Hence, the present study uses a five-point scale to measure frequency based on the perception of the respondents. This is in accordance with Joshi, Kale, Chandel and Pal (2015), who highly recommends a questionnaire with precise and clear scales, which for example in the present study, uses scales namely strongly disagree, disagree, neutral, agree and strongly agree.

3.8 Sampling

A sample of a study simply refers to the participants involved in the study (Sekaran, Bougie, 2016). In the present study, the sample for the qualitative study will be the interviewee chosen for the semi-structured interview approach, whereas respondents who fill out the self-administered questionnaire survey form were the sample for the quantitative study. The subsection below will further explain the different sampling methods used for both qualitative and quantitative approaches in the present study.

3.8.1 Qualitative Sampling

As noted by Merriam (1998), the number of recruited participants in the study is less important. Nevertheless, the contribution of each respondent to the body of knowledge pertaining to the research conducted is the most essential. Therefore, the present study decided to use a small number of respondents for the semi-structured interview. A small number of samples in the qualitative study are normal. Baker, Edwards and Doidge (2012) believed that it is better to be particular in the accuracy of data collection than the sample size. This is because the aim of the qualitative studies is not the representation of the finding to the population, but instead on the meaningful insight and information from the respondents.

In regards to the sampling techniques, a purposive sampling technique will be used in identifying the most appropriate interviewee. Purposive sampling is a sample of participants that were thoughtfully, purposely recruited in order to fully answer the research question. By doing this, the researcher will have a better chance to reach the potential interviewee in a more accurate manner, as it is quite challenging to disclose the affected food service operators who involved in food safety incidents because of its confidentiality, besides involving the business reputation as well.

For the semi-structured interview, two (2) experts from the Food Safety and Quality Division, Ministry of Health Malaysia were selected and interviewed to gain an in-depth understanding of the phenomenon being studied. In selecting the respondents for this stage, certain criteria have to be fulfilled by the potential respondents. Firstly, they were the experts who have served for more than 10 years of service in the food industry field. Secondly, they were the officers' in-charge of the food poisoning investigation in Kedah. Thus, these criteria determined the validity and credibility of the respondents.

A semi-structured interview approach was the dominant research instrument used in the present study. All interviews will be then transcribed and coded to maintain the participants' identity confidentiality. The involvement and commitment of each participant in this study are also based on the participants' willingness.

3.8.2 Quantitative Sampling

Sekaran and Bougie (2016) noted that a population consists of society, things, places or events of a study whereas sample size defined as the proportion of the population

chosen for analysis. A widely chosen sample is a good representation of the population. For decades, never-ending food safety incidents have been recorded in Malaysia, and if the root cause of these repeated incidents is not tackled, this issue will remain unsolved and putting human's life in danger.

Therefore, in the present study, the target population comprises of food service operators in Malaysia and the sample size comprises of the food service operators in Kedah. Small sample size and the target population in a quantitative study was not intended to generalize the finding of the whole population. However, the findings from the conducted case study hope to give new insight, ideas, valuable information that was often overlooked, an explanation, interpretation an even in-depth understanding of the real context that answered the research objectives.

3.8.2.1 Sampling Technique

A sampling technique specifies the process by which the sample from populations was selected. Therefore, a simple random sampling technique will be used as a sampling technique in order to determine the sample size of the present study. By applying a simple random sampling, there will be no bias issues occurred because each individual has the same probability of being chosen at any stage during the sampling process (Berger & Zhang, 2005).

3.8.2.2 Sample Size

A sample size was needed to be representative of a given population. Hence, the researcher referred to Krejcie and Morgan (1970) in determining the appropriate sample size for the quantitative method. According to the information obtained, the

total number of food premises registered in Kedah is 3108 premises. The total amount countered as of April 2018 (Ministry of Health Malaysia).

In accordance with Table 3.7, the required sample size is 341 for the population size of 3108. A total of 360 respondents will be used as samples. The amount taken exceeds the number of respondents as the researcher takes into consideration the number of respondents who may not return the questionnaire. A simple random sampling method applied due to the money and time constraint of the researcher. Even though the simple random sampling method was simpler, however, this method could obtain higher generalization as mentioned by Sekaran and Bougie (2016).

Table 3.7: Table for Determining Sample Size of a Known Population

S	N	S	N	S	N	S	N	S	N
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Source: Krejcie and Morgan, 1970

3.9 Pilot Study

A pilot study is a small scale trial run of a research design before the researcher executed the main study. It was performed in order to test all the instruments adapted from the previous studies to ensure its ability in carrying the actual data for the present study. The importance to have a pilot study was highlighted below.

Firstly, a pilot study was done in order to make sure that everyone understands the actual test. This action is crucial to prove that all of the instructions in the questionnaire survey used by the researcher were clear and comprehensive (Van Teijlingen & Hundley, 2001). The pilot test also intended to test the layout of the questionnaire in ensuring it is appropriate for the respondents and would hinder the respondents' misunderstanding of the items.

Secondly, as suggested by Van Teijlingen and Hundley (2001), a pilot study was done in determining whether the procedures need any fine-tuning or not. This process allows the researcher to firstly check whether the independent variables used in the present study have been manipulated correctly to the appropriate level in order to get the results that the researcher required.

Besides that, a pilot study tested to check whether the researcher has selected the best method to measure the dependent variables in the present study. Lastly, the test was also aimed to explore the reliability and validity of the result and also to check the statistical and analytical process to determine where they are effective. Based on the result obtained from the pilot study, a few tweaks, changes, and improvisation prior to the study can be made to the procedure if necessary before the full-scale study was

executed. By having this procedure included, it eventually assists the researcher to save time and money in the long run, and most importantly able to achieve the research objectives of the study conducted.

3.9.1 Qualitative Pilot Study

For the qualitative study approach, a pilot test was carried out to examine any deficiencies and thus provide suggestions for improvement (Strydom & Delport, 2002). Hence, for that reason, two (2) Universiti Utara Malaysia (UUM) academicians were selected based on their experience in the food industry. These two expert academicians were given the actual set of semi-structured interview questions to analyse whether the sets of questions were effective in providing necessary information prior to the research questions of the present study or otherwise.

Overall, the test revealed positive feedback in terms of its readability, the level of questions' clearness, the accuracy of the word, as well as appropriateness of the questions asked in the semi-structured interview list. However, certain improvements in terms of phrasing and word structure were needed to ensure that the real respondents able to understand the questions easily.

3.9.2 Quantitative Pilot Study

In accordance with the above arguments in section 3.8, a total of 30 randomly selected food service operators in Sintok, Kedah has answered the questionnaire as a pilot test. Based on the pilot study conducted, the value of the reliability coefficient obtained is between 0.722 ~ 0.826 as shown in Table 3.8. The figures proved that all of the items in this questionnaire can be used because it has a good coefficient value.

This is in accordance with Santos (1999), who has indicated that the alpha value of 0.7 to be an acceptable reliability coefficient.

Table 3.8: Reliability Coefficient for Multiple Items in Pilot Study ($n=30$)

Variables	Alpha	SD
Food Safety Standard Compliance	0.825	0.428
Food Safety Knowledge	0.826	0.443
Attitude on Food Safety	0.818	0.618
Hygiene Practices	0.722	0.513

Apart from that, the respondents were also asked a few questions in order to assist the researcher in improving the questionnaire instruments before distributing the sets to the actual sample. The list of questions asked to the small sample size during the pilot study was enclosed as below table.

Table 3.9: Pilot Study Questions

Questions
1. Do you have any concerns about this survey questions?
2. Do the questions easy to understand?
3. Is there any jargons included in the questions that are difficult to understand?
4. Do you have ample time to answer all of the questions?
5. What about the font and size? Is the words clearly stated and easy to read?
6. Which of the following questions that you feel was unnecessary to be asked?
7. asked?
8. How do you like to improve this questionnaire?

Upon the face validity inquiry process, the researcher discovered that several changes prior to the questionnaire survey were necessary. For instance, more time were needed for the respondents to fill up all the listed questions and letting the respondents to respond well to all of the tested items.

Besides that, several changes in terms of the structure of the questions were addressed as well. Therefore, the researcher has made a few amendments including restructuring and rephrasing the wording into simpler sentences to help the actual respondents grasp the main idea of the questions that were intended to be asked. In general, the overall problems identified have been taken into considerations, and the pilot test revealed that all of the items in the questionnaire were capable of achieving the research objective.

3.10 Validity and Reliability of the Research Instruments

Both validity and reliability are crucial in any research, as these values will determine the scientific worth of any study, thus will add value to the body of knowledge as noted by Creswell (2013). These two concepts initial in defining and measuring bias and distortion.

3.10.1 Qualitative Validity and Reliability

Validity is crucial in determining whether the methodology chosen was appropriate for the desired outcomes, the research design was parallel with the methodology, the respondents were well selected, data analysis was done systematically and finally, the outcomes were a valid context for the present study (Leung, 2015).

The present study also makes used of several strategies to ensure internal validity which includes descriptive validity and trustworthiness. Descriptive validity is one way to enable the researcher to have evidence of the collected data was accurate and factual. In order to obtain valid and detailed information in the present study, an investigation related to food safety incidents was carried out including interviews

with the key decision-makers in the food industry. Besides that, detailed documentation published by the Ministry of Health Malaysia was reviewed intensively to further enhance the validity and reliability of the present study. It is also hoped that the designed method will yield a beneficial result to upgrade the Malaysian food safety standard system.

In addition, data validity and reliability in qualitative study were enhanced and the findings were strengthened by means of triangulation, coding and quality check. The validity construct of the qualitative instruments will be referred to the experts in the food industry field. In order to ensure validity and reliability, several steps were taken as suggested by Miles, Huberman, Huberman and Huberman (1994). All the necessary processes and methods during the interview session conducted will be recorded. This is to ensure conformability, whereas internal validity is strengthened by ensuring a clear context and meaningful description as well as triangulations. This statement coincides with those expressed by Yin (2003), that triangulation of various data collection methods is crucial in conducting any case studies to provide more convincing and accurate outcomes that include investigation documents, participant observation and interviews (Denzin & Lincoln, 2011).

As mentioned by Leung (2015), consistency is the essence of reliability for qualitative research that comprises research method biases that may influence the findings. In assessing the reliability of the present study, an interview protocol was developed to strengthen the contribution in improving the quality of data obtained from the research interviews with the aims to assist the researcher during fieldwork, thus enhancing the reliability (Noble & Smith, 2015). The statement was also agreed

by Yin (2013) who mentioned that an interview protocol that is developed outside of the case study research will enhance the research reliability as it is beneficial in guiding the researcher during the fieldwork. These two concepts initial in defining and measuring bias and distortion.

3.10.2 Quantitative Validity and Reliability

According to Sekaran and Bougie (2016), a validity test was performed to test whether the instruments developed capable to measure the construct that was intended to be measured. The validity of the present study was determined by content and construct validity. The content validity can be assessed with the consideration of the researcher based on the comprehensive literature review as well as through the expert opinion in the research area.

The present study applied content validity on the questionnaire to assess whether the questionnaire is capable of retrieving the information which is the initial aim of the formulation of the questionnaire. Hence, after the questionnaire was completed, it was tested by respondents who were experts in this field. In the present study, all of the items used to measure several constructs in the present study have been evaluated in detail by academic experts from the faculty of management; two (2) associate professors and three (3) lecturers. All comments and suggestions from the experts have been considered to better improve the instruments used in the present study.

In accordance with the reliability of the developed instruments, an internal consistency method was performed to measure the questionnaires' consistency content. Internal consistency can be evaluated from the Cronbach Alpha value.

According to Sekaran and Bougie (2016), the Cronbach Alpha value of 0.7 or higher is acceptable, and the best Cronbach Alpha value is the value that closest to 1. Therefore, prior to the actual study, a pilot test was conducted by distributing questionnaire survey forms to the 30 selected respondents who run food premises in Sintok, Kedah. The respondents were identified by using a convenience sampling method. The pilot study was conducted in March 2018.

The results of the reliability analysis for the present study are shown in Table 3.10. From the table, it shows that the Cronbach Alpha value for each construct exceeds the value of 0.7, thus indicated that all of the constructs in the questionnaire are acceptable and reliable as noted by Sekaran and Bougie (2016).

Table 3.10: Reliability Test ($n=30$)

Construct	Cronbach Alpha Value	No. of items
Food Safety Standard Compliance	0.825	13
Food Safety Knowledge	0.826	12
Attitude on Food Safety	0.818	12
Hygiene Practices	0.722	8

3.11 Data Analysis Technique

In the present study, data collection was carried out in two different phases which categorized as Phase 1 (Qualitative) and Phase 2 (Quantitative). The gathered data from both semi-structured interviews and self-administered questionnaires involved different types of data analysis as both of the instruments collected different types of data.

3.11.1 Qualitative Data Analysis Technique: Content Analysis

During the first phase of data analysis, the content analysis technique has been used to provide an analytical description that provides answers to the research questions of the present study. As described by Bengtsson (2016), content analysis refers to a study of recorded human communication. It is a research method for studying documents and communication artefacts, which can be in various mediums such as messengers, text, speech, letters and any types of recorded human communication including pictures, audio, and video. Normally, social science research used content analysis to quantify patterns and communication in a replicable and systematic manner (Datt, 2016).

Referring to Datt (2016), qualitative content analysis can be based on both inductive and deductive approach. It is a research tool used to determine the presence of certain words or concepts within the text. Generally, there were two types of content analysis which include conceptual analysis and relational analysis.

Content analysis takes into following elements when analysing issues:

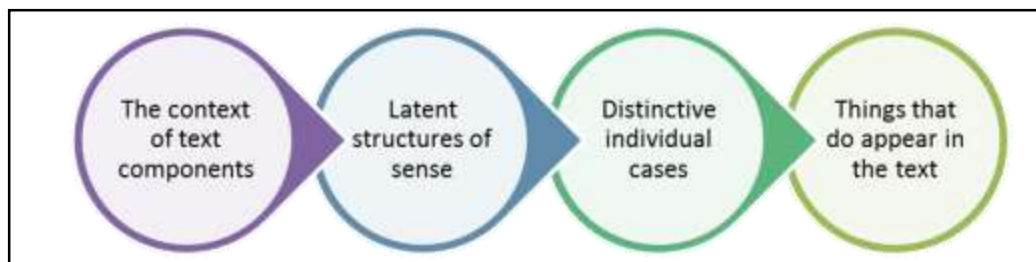


Figure 3.1: Major Elements of Content Analysis.
(Source: Kohlbacher, 2005)

A conceptual analysis determined by analysing the existence and frequency of concepts within human communication, whereas a relational analysis involved analysing the relationship of concepts within human communication. Based on the

elaborated descriptions between both conceptual and relational analysis of content analysis, the present study will fully be emphasized on conceptual analysis to answer the research questions.

In analysing the qualitative data, the researcher firstly quantifies and analyse the presence, meaning, and relationships of such words and concept. Then, the researcher developed inferences about the messengers within the text, the writers, the audiences, and even the culture and time of which these are present. One of the key advantages of this research method is to analyse the social phenomenon in a non-invasive way in contrast to simulating social experiences or collecting survey answers. The three steps of qualitative data analysis performed in the present study involving data transcription, data codification and finally ended with the formulation of themes based on the coded data.

3.11.1.1 Transcription of Data

The first step in the qualitative analysis involved data transcribing. Transcription of data is a change of media from the recording of interviews in an audio form and represented it in into a written account for a closer study (Moore & Llompart, 2017). Data transcription was done because it is easier to work with transcribed data rather than recording audio. This is because, transcribed data assists the researcher in reading, analysing and interpreting information with ease, precise and concise as well as easily understandable. The statement was agreed by Churcher (2017), who emphasized that data transcription was an essential component in qualitative research since it recognized the task of handling the qualitative research data during and after

the interview, which includes the accuracy and authenticity of the data before the researcher can further proceed with the codification of data.

3.11.1.2 Codification of Data

Coding was done when the researcher was fully familiar with the data that have been gathered. Coding, however, is quite straightforward in that labelling sections or passages of text with a code word. Besides, coding was about identifying within the text interesting or salient features of the data that relate to the research questions or the research objectives. Coding can be done at a fairly basic level whereby the researcher was looking at the words gathered and coding based on the words that have been transcribed. Besides that, practicalities of coding can be done by using highlighter pens, coloured pens and post-it notes to gets more and more familiar with the data. The idea is to go through the entire data set and code that material. However, multiple codes were allowed for the same segment of text.

3.11.1.3 Formulation of Themes

Next, the analysis process continues to the last step of the analysis, which was the formulation of the theme. Theme identification is one of the most fundamental tasks in qualitative research. In this step, the researcher read through the coded data and determined their relationship or their connections to the other data. The researcher then placed the data under themes that explain the data. The theme may stand on its own or might have sub-themes which helps to explain the data. This process depends on the researcher's understanding and interpretation of the data.

In conclusion, qualitative data can be huge. A thorough analysis was done systematically to ensure that the transcribed data assist the researcher to achieve the research objective of the present study. Please refer to Appendix E on the example of qualitative content analysis showing meaningful units, condensation, abstraction, and formulation of themes performed in the present study.

3.11.2 Quantitative Data Analysis Technique: SPSS

An IBM Statistical Package for the Social Science (SPSS) version 2.1 software was practiced to analysed collected quantitative data. Before conducting an analysis, a data cleaning process was an essential step for analysing data. The main procedures conducted for data cleaning will be addressed in the present study. Data cleaning is the process of preparing data set for analysis. For instance, outlier analysis and normality test were performed to clean the unnecessary data.

3.11.2.1 Outliers

An outlier is an extremely high or extremely low value in the data set. Outliers usually can be identified through a scatter plot in SPSS. These outliers can significantly skew data from a normal distribution as well as affecting the accuracy of data analysis techniques. Besides, an outlier also may affect how well a sample represents the population. Therefore, it is essential to identify outliers in the data gathered as it may influence the external validity of the generalization of any results it might have.

3.11.2.2 Normality Test

A normality test was performed as it may describe a symmetrical bell-shaped curve that has the highest frequency of scores towards extremes in small and middle frequencies (Pallant 2005). Commonly, histograms, normal Q-Q plots and box plots should visually indicate whether the gathered data are approximately normally distributed. However, the gathered data does not have to be perfectly normally distributed, as long as they were approximately normally distributed.

In the present study, the characteristics of normality were tested using skewness and kurtosis. The skewness and kurtosis measures should be as close to zero as possible. A small departure from zero is, therefore, no problem, as long as the measures are not too large compared to their standard error. As a conclusion, the data can be considered as a normal data when the ratio for each statistic of skewness and kurtosis is somewhere between -1.96 and +1.96 (Hair, Anderson, Tatham & Black, 1998).

3.11.2.3 Descriptive Analysis

The present study also provides a statistical descriptive analysis such as frequency, the mean and standard deviation of a data. Descriptive statistics describe the data. According to Coakes and Steed (2007), the frequency distribution will display the frequency of occurrence of each score. The mean score on the other hand, tells us about the average height, whereas a standard deviation describes how spread out the heights is around that average. These analyses will be conducted on the demographic data and research variables of the present study.

3.11.2.4 Factor Analysis

Factor analysis is a method of data reduction that reduces a large number of variables into a fewer number of factors (Hair, Black, Babin & Anderson, 2010). The use of factor analysis in a research study is to explain the variant and covariance of a set of observed variables in a population by a set of typically fewer unobserved factors and weightings. Through factor analysis, an interconnection between these samples can be seen and analysed as it decreases the number of variables and clustered them under factors (Nunnally, 1978).

3.11.2.5 Reliability Test

Reliability refers to the consistency or precision in the research measurement. A correlation coefficient is one of the ways of assessing the degree of reliability. Therefore, a reliability test was performed in the present study to measure the precision of all of the items tested in the questionnaire survey through Cronbach alpha values.

3.11.2.6 Pearson Correlation Analysis

The strength associated with the variables can be tested by using the Pearson correlation analysis. In order to study the relationship between the variables, a scatter plot was drawn to measure its linearity. The present study measures the significance of the studied variables with the used of Pearson correlation analysis.

3.11.2.7 Regression Analysis

Regression can be defined as using the relationship between variables, which can also be referred to as correlation to find the best fit line that can be used in making

predictions. The primary focus in performing a regression analysis in the present study is trying to predict the influence of one or more independent variables on a dependent variable.

3.12 Chapter Summary

This chapter discussed in detail the approach used in conducting the present study which emphasized both the qualitative and quantitative research design in order to achieve research objectives. Therefore, Table 3.11 described the summary of analysis techniques employed in the present study.



Table 3.11: Summary of Research Questions, Tools, and Propositions / Hypotheses

Code	Research Questions	Tools	Propositions / Hypotheses
RQ1	What has been the consequences of food poisoning incidence to the food business?	Content Analysis	There are several impacts of food poisoning incidence to the food business.
RQ2	Who has the operational responsibility to ensure the food produced is safe for human consumption?	Content Analysis	Food service operators hold the operational responsibility in making sure the food produced is safe for human consumption.
RQ3	Why do the cases of food poisoning incidents keep increasing despite the establishment of Malaysian food safety standards?	Content Analysis	The unfavourable attitude of food service operators that contribute to food poisoning incidents.
RQ4	Do the existing Malaysian food safety standards support/assist food service operators in conducting food preparation processes?	Content Analysis	Malaysian food safety standards is comprehensive that it should be assisting food service operators in daily business operation.
RQ5	To what extend do food service operators comply with Malaysian food safety standards?	Self-administered Questionnaire Survey	<p><i>Hypothesis 1:</i> There is a significant relationship between food service operators' knowledge and food safety standard compliance.</p> <p><i>Hypothesis 2:</i> There is a significant relationship between food service operators' attitude and food safety standard compliance.</p> <p><i>Hypothesis 3:</i> There is a significant relationship between food service operators' hygiene practices and food safety standard compliance.</p>

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

The previous chapter provides an explanation about how the present study was carried out, while this chapter reports on the results of data analysis. Besides, this chapter also reports on the findings and discussions of the present study which were derived from various analyses based on both the qualitative and quantitative data.

In the present study, the qualitative data from the semi-structured interview were transcribed and analysed using the content analysis technique while the data from the questionnaire survey were scored and analysed through IBM SPSS version 2.1 software. The description of the findings from the analyses was consecutively made according to the research questions for better and clearer explanations.

Phase 1: Reporting Qualitative Results

Since qualitative data is non-measurable, the data analysis is often constructed around themes. To support the analysis, it is a common method to directly quote from the interviews. At the end of the day, the main concern is to present on the findings of a study in such a way that future researchers who wish to use them as reference able to understand what has been done and what the results were. The research questions of the present study were further explained in the sub-section as below.

4.2 Factors Contribution to the Emergence of Foodborne Diseases: A Case Study

Based on the research objectives as mentioned earlier in chapter one, the present study aims to explore the main causes of frequent food safety incidents in Kedah by applying the knowledge, attitudes, and practices (KAP) model, on selected food service operators in regards to their food safety and hygiene practices while handling food. Besides that, the researcher also aims to identify which of these three traits triggers the occurrence of food poisoning episodes in Kedah and finally able to determine the food safety standard compliance level of the food service operators.

Generally, the researcher has had two sources of a data approach in answering this particular research question. One through the semi-structured interview survey, and secondly through the questionnaire survey as a complement to the qualitative research approach.

4.2.1 Climate Change

Food poisoning cases were not new issues in Malaysia. One of the contributing factors to the event of food poisoning is the temperature. The hot and humid weather in the country helps in expediting the bacteria growth. This statement was agreed with Soon et al. (2011) and Abdul-Mutalib (2015) who stressed out that the number of foodborne outbreaks may be influenced by the country's climate change. In certain cases, appropriate temperature and weather conditions may contribute to the high volume of bacteria growth that affects directly the foodborne incidence in Malaysia. In a separate study done by Hellberg and Chu (2016), the researcher claimed that an increase in temperature between 25°C to 37°C can produce the strong

form of a bacteria called *Vibrio parahaemolyticus* which causes gastrointestinal illness in humans and cholera. Apart from that, another study by Uyttendaele (2015) concluded the survival rate of food pathogens such as *E. coli* *O157:H7* and *Salmonella* spp. in the food chain relies heavily on temperature increase and climate change in the county.

“The hot weather in kampung increased the likelihood of bacterial growth”
– Interviewee #2

Generally, interviewee #2 also claimed that the increased of ambient temperature at both Kampung Huma and Kampung Jawa, Kedah does impact the foodborne illness with the proof of the *Salmonella* bacteria existence in the chicken which expedites in warm weather. This is because *Salmonella* bacteria multiply faster in food with the temperature between 25°C to 37°C. Therefore, from the above arguments, a clear and more intention should be stressed out on the climate changes in food safety management and future research for a safer food consumption.

4.2.2 Contaminated Ayam Masak Merah at the Wedding Banquet

Despite various food safety measures taken by the state authorities, foodborne incidence outbreak can never be solved. Taken as an example, Kedah food poisoning cases. The foodborne outbreak in Kedah has reached an alarming level in the year 2013 when the most feared foodborne pathogen in Malaysia - *non-typhoidal Salmonella* (NTS) has caused many outbreaks and deaths; four people died and leaving sixty-five lives warded. This shocking and heart-breaking news had caught the attention of all media and the people upon reported. All of the food poisoning victims suffered foodborne illness after consuming *Salmonella* contaminated Ayam

Masak Merah (Chicken in Spicy Red Sauce) at a wedding feast in Kampung Huma, Tanjung Dawai, Sungai Petani, Kedah.

“Yes, it comes from the ayam masak merah dish”.

– Interviewee #1

“As a result of investigation, it was proven that ayam masak served at the wedding feast were contaminated and had caused the foodborne illness in Kampung Huma”.

– Interviewee #2

During the semi-structured interview session with the two respondents, the researcher had questioned on the true incidence of foodborne illness that took place in Kampung Huma, Tanjung Dawai back in September 2013. Upon interviewed, it was revealed that four death victims and the remaining sixty-five warded came down with food poisoning after they consumed a chicken dish served in a wedding feast on Saturday.

Based on the two respondents, the symptoms of *Salmonella* food poisoning often showed very quickly, usually within 8 to 72 hours upon consumption. Typical symptoms during the acute stage include diarrhoea, fever, muscle pain, nausea, vomiting, signs of dehydration and body cramp. Similar to the situation, all of the victims showed food poisoning symptoms shortly after consuming the chicken dish. They had diarrhoea symptoms and get dehydrated easily – lose a large amount of water from the body. The respondents added, dehydration caused by diarrhoea is a serious concern especially to children, infants, and teenagers. The first death victims experienced dehydration within a day. Upon diagnosed, the first victim was severely dehydrated as she consumed the chicken dish the most; at the wedding feast and also take away dishes to be eaten at home, which leads to her death.

“The first victims were said to have vomit and diarrhoea so much that they had run out of batik sarong because of the deceased’s diarrheal stain”.

– Interviewee #2

“The first victims’ diarrheal is very watery. She was completely exhausted because of dehydration”.

– Interviewee #2

The second respondent further explained that dehydration occurred when one’s body is lack of fluid. Severe diarrhoea complications may cause dehydration. It causes the body system to dry up very quickly if no water restored for the body to function normally. A similar situation applied to the case. All of the victims suffered from severe dehydration which leads to deaths.

4.2.3 Free From Typhoid Vaccination

Typhoid fever is a serious disease caused by bacteria called *salmonella typhi* which causes high fever, extreme tiredness and lethargy, stomach pains, headaches, loss of appetite, and sometimes rashes. It is the result of having infected food or water. If it is not treated, it can be life-threatening to the people who were affected by it.

“Typhoid fever is very serious. It caused high fever, stomach pain, headache and loss of appetite”.

– Interviewee #2

“If not treated, it can lead to death”.

– Interviewee #2

However, despite the importance of typhoid vaccination, all the relatives and villagers who handled foods during the wedding feast were free from vaccination since the residents cooked together for the occasion. Nevertheless, failure in getting the vaccination shot was not a major issue that caused food poisoning incidence.

“The villagers cooked with the spirit of mutual cooperation for the wedding feast. They were divided into groups and were given specific tasks in preparing for the occasion such as frying, cooking, cleaning, etc.”

– Interviewee #2

“They were free from vaccination shot as most of the food handlers were consists of housewives who gathered in helping the occasion. It was a common situation in a village who hold a feast.

– Interviewee #2

4.2.3.1 Typhoid Vaccination

Based on the statement given by the second respondent, typhoid fever is a potentially life-threatening infection that is contracted by consuming contaminated food or water and occasionally through contact with the infected person. The bacteria are passed in the faeces and urine of the infected people.

Besides that, eating food prepared by someone with an infection who has not washed hands carefully after using the toilet may also spread the infection. Therefore, it is important to ensure that people who handle food are not typhoid carriers. However, typhoid fever can be controlled through a vaccine shot which can be obtained by either taking pills or by receiving a shot.

In Malaysia, all food handlers were obliged to comply with the Food Act 1983 and Food Hygiene Regulation 2009. Further elaboration described as below:

Food Act 1983

Food Hygiene Regulations 2009

31. Medical Examination and Health Condition of Food Handler

- (1) A food handler shall be medically examined and vaccinated by a registered medical practitioner.*
- (2) Any food handler who suffers from, or is a carrier of food-borne diseases or suspected to be suffering from, or to be a carrier of food-borne diseases shall:-*
 - (a) Not be allowed to enter food premises or handle food;*
 - (b) Immediately report to the management of food premises pertaining to his health condition; and*
 - (c) Be suspended from working in food premises until he is certified cured from the disease and medically fit to work by a registered medical practitioner before he is allowed to enter the food premises or handle food.*
- (3) Any food handler who fails to comply with sub regulation (1) or (2) commits an offence and shall, on conviction, be liable to a fine not exceeding ten thousand ringgit or to imprisonment for a term not exceeding two years.*

“Food handlers were obligated for typhoid injection under Food Act 1983 and Food Hygiene Regulations 2009”.

– Interviewee #1

Typhoid vaccination is currently compulsory for all Food and Beverages (F&B) service operators under the Malaysia Food Act 1983 and Food Hygiene Regulations 2009. They only have to get the shot once every three years. It is the most effective and inexpensive method to prevent diseases. There were two types of anti-typhoid vaccine practiced in Malaysia which is in the form of a pill-shaped vaccine for consumption and vaccine given through injection. However, the use of injection vaccines is more popular than pills in Malaysia.

The oral vaccination consists of three pills that were taken on the first, third and fifth day so that in seven days, all three pills have been taken. The entire course of pills should be completed at least one week before the food service operators were allowed to work in the kitchen areas. The pills need to be refrigerated, should be consumed with an empty stomach, should not be crushed and antibiotics should not be taken while taking the oral vaccination pills and for 24 hours after completing them.

For the vaccine shot, the immunity usually lasts for three years and the cost for the shot is only RM 21.00. It should be obtained at least two weeks before expected exposure and will give immunity for 36 months. Immunization was given in every three years for food service operators, and usually, the vaccine was injected in the arm or thigh.

As stressed out by both respondents, it is the responsibility of the food premises' owners as well as food service operators to get the anti-typhoid immunization vaccine in controlling the spread of typhoid fever. This is because pathogens causing typhoid fever are highly contagious and that food service operators can be responsible for starting the major typhoid outbreak. Therefore, vaccination shot is compulsory.

4.3 Case Study Chronology

A wedding ceremony was held in September 2013 to celebrate the marriage of Haslina Yusuf, 22, and her beloved husband, Mohd. Fauzan Zakaria, 26. A total of 2,000 guests were invited to witness the celebration of these two lovebirds.

Therefore, relatives and villagers were gathered in preparing delicacies to be served at the wedding feast. There were few dishes served including *ayam masak merah*, *gulai ikan talang*, *kerabu pucuk paku*, and *sambal ikan bilis kacang*. However, among all of the served dishes, only *ayam masak merah* was found contaminated with *salmonella* bacteria that caused the food poisoning outbreaks in Kedah. It was a massive and horrifying food safety incident that ever happened in Kedah. Generally, the episodes gave a huge impact to the villagers and the public as well.

“The fatal food poisoning episode at the wedding feast somehow affected the public. The villagers especially started to aware of the importance of safe food handling and preparation”.

– Interviewee #2

“The worst food poisoning incidents in Kampung Huma was the turning point for the food service operators in maintaining safe food production”.

– Interviewee #1

“This episode has caught the attention of Malaysian”.

– Interviewee #2

The Location

Eventually, there were two separate venues. The first venue was located at Kampung Jawa where the first batch of chicken was cleaned and stored, whereas the second venue was at Kampung Huma, where the wedding ceremony was held. There were two separate locations because the host seeks assistance from the younger sister who stayed in Kampung Jawa to handle the first batch of chicken. The distance between Kampung Jawa and Kampung Huma was approximately 20 kilometres that took about 20 minutes of driving to arrive.

“There were two separate locations. One in Kampung Jawa, and the other one in Kampung Huma. There were two locations because the host seeks assistance to clean the chicken.

– Interviewee #2

“The chicken was also sent in two batches. The first batch was sent to Kampung Jawa to be cleaned and stored, and the second batch of chicken was sent on the next day at Kampung Huma”.

– Interviewee #2

“The wedding occasion held in Kampung Huma. The distance between these two locations is about 20 kilometres”.

– Interviewee #2

27th September 2013 (Thursday)

The First Batch of Chicken Arrival

The chicken were sent in two batches. The first batch of chicken was sent a day earlier to the first location in Kampung Jawa. A total of 80 chicken was delivered to Kampung Jawa to be cleaned and processed, while the remaining 50 chicken were sent to Kampung Huma on the next day. In total, the wedding host bought 130 chickens to be served for 2,000 guests at the wedding bouquet. Each chicken was cut into 16 pieces. To sum up, there were a total of 1,280 pieces of chicken to be cleaned on the first day of delivery. The chicken was slaughtered in the morning of the same day and was sent directly to Kampung Jawa upon slaughtered. The chicken arrived at Kampung Jawa by 11.30 in the morning.

“The chicken was sent in two batches. 80 chickens were sent on the first day at Kampung Jawa and the remaining 50 chicken was delivered on the second day at Kampung Huma. There were 130 chicken altogether and were cut into 16 pieces each”.

– Interviewee #2

“The chicken was slaughtered on the same day of deliveries”.

– Interviewee #2

11.30 am - The Cleaning Process Started

The cleaning process started at 11.30 in the morning and was held at Kampung Jawa's community hall. The villagers gathered to clean all of 1,280 pieces of chicken and the cleaning process ended by 2.30 afternoon on the same day. The villagers took about 4 hours to clean the chicken.

"The villagers gathered at Kampung Jawa's community hall to clean the chicken. The cleaning process took 4 hours".

– Interviewee #2

2.30 pm – Wrapping Up the Chicken

Upon cleaning, the chicken was then packed in a black plastic bag, tied up tightly before being placed in the refrigerator provided at the community hall. The black plastic beg was quite thick and it was then stacked in three layers and were left overnight before sending those chicken to Kampung Huma for frying process on the next day. The villagers dismissed once the task completed.

"Black plastic beg was used to pack the cleaned chickens. It was then refrigerated at the community hall before being sent to Kampung Huma on the next day. The chickens were stacked in three layers".

– Interviewee #2

The Refrigerator's Temperature

Originally, the refrigerator's knob was at level 1 during the entire cleaning process. Upon stacking all of the wrapped chicken in the black plastic bag, then only the knob was adjusted to the lowest temperature 6. The temperature adjustments were made only after the chicken was inserted into the refrigerator. The temperature knob was at level 1 throughout the chicken cleaning process. According to the interviewee, the refrigerators' temperature should be adjusted to level 6 before inserting the chicken.

This will let the refrigerator to chill properly. Preferably, the refrigerator should be cooled within 24 hours before usage.

“The refrigerator temperature should be adjusted to level 6 before inserting the chicken in the refrigerator, or at least to be chilled within 24 hours before usage”.

– Interviewee #2

28th September 2013 (Friday)

9.00 am - Chicken only Chilled, not Frozen

The next morning, the sister's host went back to the community hall to transfer all of the refrigerated chicken to Kampung Huma for the cooking process. Once arrived, she was so shocked to found out that all of the chicken was not in a frozen state even though it was left overnight in the refrigerator. The chicken was left to be refrigerated for 15 hours, and it was not in solid frozen condition, instead were only in chilled condition. Even in such condition, the chicken was send to Kampung Huma to be cooked.

“On the next day, the sister's host found that the chickens were in chilled condition, not frozen. She then sends those chickens to Kampung Huma for the frying process”.

– Interviewee #2

Found a Piece of Spoiled Chicken

While waiting for the second batch of chicken to arrive, the first batch of chicken was prepared for cooking. The chicken was first powdered with salt and turmeric before went for deep frying. However, by just a glance, the sister's host found out that only a piece of chicken started to change colour. Without hesitation, she threw the spoiled pieces away, and proceed with chicken frying without checking the entire

batch of chicken despite noticing a piece of spoiled chicken earlier. She felt that the remaining chicken was still edible and thus proceed with frying it.

“Just a piece of chicken that changed colour”.

– Interviewee #2

“Only a glance and do not examine the whole quantity of chicken”.

– Interviewee #2

Frying Equipment

Instead of using proper frying equipment, the villagers make use of a metal fan cover net as frying equipment. The chicken was firstly arranged on the fan cover net, and it was then dipped into the hot oil, without flattened it perfectly in making sure the chicken was thoroughly cooked.

“A metal fan cover were used as frying equipment to fry the chickens”.

– Interviewee #2

Cooking Technique

The chicken was deep fried for 15-20 minutes per batch. Approximately 25-30 pieces of chicken were fried at the same time. A deep-frying technique was used to fry the chicken to avoid the chicken from sticking to the base of the pan. The chicken was only left on the frying pan without tossing it properly to ensure the chicken was cooked to perfection.

“By using a deep frying technique, 25-30 pieces of chickens were flattened on the fan net surface and were dipped into hot boiling oil for 15-20 minutes”.

– Interviewee #2

11.30 am – The Arrival of 50 Chicken (Second Batch)

The remaining 50 chicken arrived at Kampung Huma at 11.30 in the morning. The chicken was cut into 16 pieces each, which gives a total of 800 pieces of chicken.

These 800 of chicken were cleaned and fried on the same day.

“The second batch of chicken were delivered at Kampung Huma. 50 chicken this time. It was cut into 16 pieces each. The chickens were cleaned and fried on the same day”.

– Interviewee #2

3.00 pm –Preparing Chicken Hot Sauce

After the Friday prayers, the villagers gathered to prepare the ingredients for the chicken gravy.

“The chicken gravy (ayam masak merah sauce) were prepared by the relatives and villagers after the Friday prayers”.

– Interviewee #2

4.30 pm – End of Deep Frying Session

The deep-frying process ends up by 4.30 in the afternoon. The total of 2,080 pieces of chicken was stored in a huge saucepan and was left in room temperature for another 15 hours before the banquet starts on the next day.

“A total of 2,080 pieces of fried chickens were stored in a huge pan overnight before the banquet starts on the next day”.

– Interviewee #2

8.00 pm – Cooking Chicken Gravy

The chicken hot sauce starts cooking and was done two hours later. The cooked hot sauce was cooled at room temperature and stored for another 9 hours.

“The sauce were prepared at 8 o’clock at night and were left overnight before being mixed together with the fried chickens earlier tomorrow”.

– Interviewee #2

29th September 2013 (Saturday)

The Fateful Tragedy

7.30 am – Reheating Process

The hot chicken gravy sauce was reheated and mixed with the fried chicken which has been cooled earlier. It was made in 2 batches. The reheating process took about 30 minutes. Due to a large amount of chicken, 1,040 pieces of chicken been heated simultaneously within 30 minutes per batch. The reheating time for the chicken was insufficient because the chicken was not heated thoroughly. Next, the heated *ayam masak merah* were then stored at room temperature for another 4 hours before the banquet started at noon.

“The reheating process starts early in the morning of the wedding feast day. The chicken sauce was mixed with fried chickens and reheated in two batches, 30 minutes each batch. It was then being kept in room temperature for 4 hours before the guest arrived”.

– Interviewee #2

“30 minutes of reheating were insufficient for 1040 pieces of chicken because it is believed that those chickens were not heated thoroughly”.

– Interviewee #2

Both the first and second batch of chicken have been mixed together during the reheating process. It was assumed that the guest who was not exposed to food poisoning despite consuming chicken dishes at the wedding ceremony because they consumed the second batch of chicken. On the other hand, majority of the guest who attended the ceremony between 1 to 3 o’clock were heavily affected by *salmonella*

poisoning. Therefore, based on the investigation and evidence, it was concluded that the main cause of the foodborne outbreak in Kampung Huma was the contaminated chicken dish.

“Upon investigation, it was confirmed that the chicken dish was contaminated and causes the foodborne outbreak at the wedding banquet”.

– Interviewee #2

4.3.1 Salmonella Contaminates Chicken Dish at Wedding Feast

The food poisoning incident resulted in four deaths during a wedding reception in Kampung Huma, Tanjung Dawai, Sungai Petani, Kedah were caused by *ayam masak merah* which has been contaminated by *salmonella* bacteria due to improper storage. All of the foodborne outbreak victims died due to severe dehydration caused by *salmonella* bacteria in the contaminated chicken dish. The fateful reception was held in September 2013. The four deceased were identified as Nurshazana Mohd Rashid, 24, Mohd Nor Rahmat, 11, Ibrahim Mohamad, 62 and Wan Razali Yaakob, 56.

The first victim, Nurshazana was pronounced dead at 12.45 p.m. at her house in Kampung Tempoyak, Bedong. She suffered stomach ache and had severe diarrhoea after returning from the wedding banquet and her condition worsened on Sunday. She was found unconscious in her bedroom and was reported died. She suffered the worst *salmonella* symptoms compared to the other victims because she had the most chicken dish. She ate chicken dishes at the wedding feast and also take away dishes to be eaten at home - that leads to her death.

“The first victims were said to have vomit and diarrhoea so much that they had run out of batik sarong because of the deceased’s diarrheal stain”.

– Interviewee #2

The second victim, Mohd Mor Rahmat, 11, from Kampung Singkir Laut died at 1.00 p.m. at Yan Hospital, Kedah. He suffered stomach aches after consumed the chicken dish at the wedding feast. His condition worsened on Sunday morning, thus his family rushed him to Hospital Yan for further treatment. However, he became unconscious and was pronounced dead at the hospital.

Ibrahim Mohamad, 62, from Kampung Huma, the third victim was also pronounced dead at 6.30 p.m. at Sultan Abdul Halim Hospital, Sungai Petani. Whereas the fourth victims who died from food poisoning were identified as Wan Razali Yaakob, 56, from Kampung Banggol, Merbok died at 7.15 p.m. in the same hospital.

Upon the fatal tragedy, both of the hosts and his family is affected as well. They suffered from nausea and vomiting thus they were admitted at Yan Hospital, Kedah for further treatment. Besides that, other 65 guests were also admitted to the hospital after they showed symptoms of food poisoning whereas more than 170 guests who attended the wedding banquet and suffered similar symptoms of vomiting, diarrhoea and stomach ache had sought immediate treatment at several hospitals and clinics to prevent more unwanted incidents. However, more victims were discharged as they were getting better.

It was said that the neighbours, family members, and friends who were affected by the incidents did not blame the host despite the tragic incident, instead, they were

being hit on social media for causing the fatal tragedy. The family has also been accused of purposely poisoned the food. Nonetheless, the host family apologies to all of the guests and they never thought the wedding would turn out fatal.

4.4 Theme 1: Inexperience Food Service Operators Messed Up Cooking

Foods must always be cooked and held at the correct temperature. It is the basic food defence against foodborne illness. This is because most bacteria do not grow in very hot or cold temperatures. However, to prevent time and temperature abuse, the amount of time food spends in the danger zone must be minimized. This is because foodborne bacteria can grow faster in the danger zone. May this fatal incident be a lesson learned to us all.

The incidence of foodborne illness is a major concern for food safety issues in Malaysia. Some common factors that contribute to the emergence of foodborne pathogens include cross-contamination between foods and food service operators, mishandling of food, antimicrobial resistance bacteria, and climate change. However, the main problems that contribute to the high rate of foodborne illness during the wedding festive in Kampung Huma, Tanjung Dawai, Sungai Petani Kedah in the year 2013, were due to the poor handling practices from the non-experienced food service operators. This is because all relatives and villagers who participated in the food preparation were consists of housewives with no assistance and proper guidance from the food industry experts.

“They have no experience in handling a huge amount of foods”.

– Interviewee #2

“Always in-charge of cooking light meals such as fried noodles for small functions only”.

– Interviewee #2

Nevertheless, food service operators with an extensive experienced and well versed knowledge in food handling and cooking practices in managing the wedding banquet could minimize the effect of fatal tragedy outbreaks. This incident will forever be regretted and hoping that no similar incidents ever repeated again in the future.

4.4.1 Subtheme 1: Time and Temperature Abuse, the Silent Killer

Temperature control is a strong defence against foodborne illness and injuries. Therefore, cooking meat and poultry is no exception. It is also vital when it comes to handling cold foods as time and temperature are important factors in food quality. Always keep cold foods at -5°C or less. This is because, refrigerator temperatures do not destroy pathogenic microorganisms, instead of slowing the growth of the pathogens. Foods can be kept in refrigerators, ice, or other approved method to keeps bacteria from growing. For example, when using ice to keep food cold, the ice must surround the container to the top level of the food.

In the case study, the food has been time and temperature abused in examples as follows:

- a) Not being held or stored at the correct temperature,
- b) Not cooked or reheated enough to kill pathogens, and
- c) Not cooled completely.

Concerning the case, improper storage of the raw chicken had resulted in *salmonella* bacteria contaminants. This is because the first stage of food preparation is always vital in minimizing the risk of foodborne pathogens. Besides, the temperature of the refrigerator also plays an important role in maintaining the freshness of the raw chicken which directly ensures safe food consumption. Initially, the refrigerator was supposed to be conditioned overnight before usage. Incorrect use of temperature could spoil the food stored in a refrigerator.

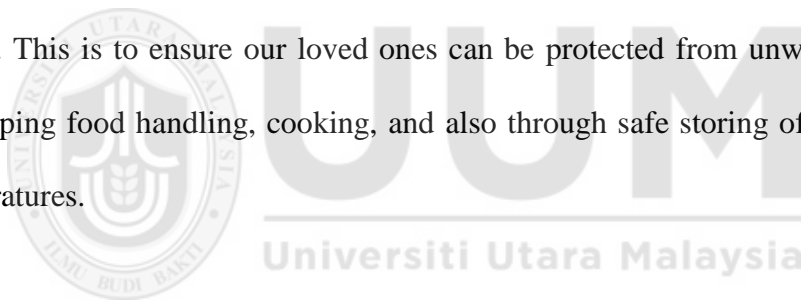
Apart from that, the temperature in a refrigerator should at least be at 4⁰C or below throughout the unit, so that any place in the refrigerator is safe for the storage of any food. In this case, as the raw chicken was not in the frozen state even though it was left refrigerated overnight, the bacteria had multiplied abundantly. This is because the refrigerator's temperature was adjusted only after the raw chicken was inserted caused a longer time taken to conditioned the refrigerator. As a result, when food has stayed too long at warm temperatures, it gives room for pathogen growth. The danger zone in which the bacteria can grow rapidly is between 4⁰C and 60⁰C.

Besides that, the chickens were also been time and temperature abuse several times that helps in pathogens growth:

- a) Not cooled completely in the refrigerator even though it were left overnight,
- b) Deep frying process with 25-30 pieces of chicken fried simultaneously for 15-20 minutes per batch,
- c) After the deep frying process, the chickens were left in room temperature for another 15 hours before being mixed with the gravy on the next day,

- d) The reheating process only took 30 minutes to reheat 1,040 pieces of chicken per batch. The reheating process was done in two batches,
- e) The chicken gravy was cooled in room temperature for 9 hours, and
- f) After reheating the *ayam masak merah* on the event day, the chicken once again left in room temperature before being served to the guest at noon.

In reference to the above explanation, a massive time and temperature abuse at the entire food handling practices had allowed foodborne pathogens to multiply abundantly. The chickens were exposed in danger zone way too long has resulted in raw material spoilage with the changes of colour in a piece of chicken. Hence, a safe food handling practices at every process are vital as a defence against foodborne illness. This is to ensure our loved ones can be protected from unwanted outbreaks by keeping food handling, cooking, and also through safe storing of foods at a safe temperatures.



4.4.2 Subtheme 2: Wrapping Techniques Prolonged Cooling Process

In essence, raw meat and poultry should be in a sealed container or at least wrapped securely to prevent its' raw juices from contaminating other foods. In reference to the case, there were no other raw materials kept together in the refrigerator except for the raw chickens. However, the wrapping technique must not be overlooked in preventing any foodborne illness.

The condition of raw chicken being packed was also a contributing factor to the bacteria spread. In the fatal incidence, the raw chickens were said to be wrapped in a thick, black-coloured plastic bag before being stacked in three layers in the

refrigerators. The plastic bag usage in packing raw chicken was not a crime, however, the use of thick, black-coloured plastic bags seems unreasonable. Adding to the matter, black-coloured plastic bag absorbs more heat compared to the lighter-coloured bag, thus delaying the cooling process of the raw chicken. Besides that, refrigerator temperatures can cause plastics to deteriorate, which increases the leaking of chemicals in the food when it was taken out from the refrigerator for thawing or reheating. Therefore, with the replacement of thick and black-coloured plastic bags with a vacuum pack, freezer bags or at least a thinner, the see-through plastic bag would be more reasonable as it assists in cooling the raw chicken in a faster manner.

Apart from that, the way that the thick, black-coloured plastic bag is fastened was also an issue. It was agreed that the meat and poultry should be sealed tightly to prevent any contacts with other raw materials in refrigerators. However, the thick, black-coloured plastic was fastened tightly which prevents proper ventilation. As a result, the raw chicken was not in the frozen state even though it was left for 15 hours in the refrigerators, thus expedite the growth of the pathogen. Literally, all of the raw chickens should be wrapped in a thin plastic bag and loosen it to release the hot steam and thus accelerate the freezing process.

4.4.3 Subtheme 3: Proper Stacking Technique not Helping

Initially, all foods must be stored at least six inches above the refrigerator's floor. By practicing this method, the risk of water pollutants from the raw materials can be avoided. Besides that, another method in ensuring the refrigerators maintain a safe temperature is to avoid overloading with too much stuff. This is because by having

too many items in the refrigerators, extra precaution needed in keeping the temperature low is crucial. Besides, by overfill the temperature, it became difficult for the air to circulate.

With the means to prevent cross-contamination, the villagers had made a wise move in covering the bottom surface of the refrigerator with a tray to keep the raw chickens from touching the bottom surface. Besides that, they also avoid overstocking in the refrigerators. There was an indicator of the maximum line in the refrigerator, and the raw chickens did not exceed the maximum line. Therefore, there were no activities of overstocking in the refrigerators that prevents air circulation in the refrigerator.

4.4.4 Subtheme 4: Improper Holding Time and Temperature makes it Worst

Holding time and temperature key concept is rather simple, keep hot foods hot, and cold food cold. Unfortunately, it is one of the top causes of foodborne illness. The temperature danger zone is any temperature between 4 and 60 degrees Celsius. This is where the harmful bacteria rapidly reproduce especially to the potentially hazardous food.

For instance, the chicken has been in the danger zone for more than 4 hours as per the case chronology:

- a) The first batch of raw chicken was left in an unconditioned refrigerator for more than 4 hours,
- b) The fried chicken was cooled in room temperature for another 15 hours till the next day,

- c) 30 minutes of reheating process for 1,040 pieces of chicken is inadequate because of the large amount of meat being reheated simultaneously,
- d) The chicken gravy was cooled in room temperature for 9 hours, and
- e) Ready-to-eat chicken dish was left at room temperature for another 4 hours before the guests arrive.

Therefore, it is so important to gradually monitor time and temperature during the entire food preparation process. It was suggested to move the food as quickly as possible out from the danger zone because bacteria produced toxins that were not destroyed by reheating temperatures.

4.4.5 Subtheme 5: The Innocent Meat and Poultry Supplier

When it comes to food safety, raw meat and poultry are among the highest risk to be contaminated. Therefore, it is crucial to guarantee the safety of the food produced at every stage; from farm to fork. Nevertheless, food safety also depends on the ability to trace the appropriate supplier and able to identify the source of meat and when it was produced.

Based on the interviews, there were no signs of bad odour coming out from the raw chicken. Hence, it was confirmed that the raw chicken supplied by the supplier were in fresh condition upon deliveries. The chickens were supplied from Ladang Charok Pok Padang Ehsan located in Sungai Bayor, Kedah. All of the chickens were brought alive to Yan's central market for the slaughtering process before it was sent to Kampung Huma for cleaning and storage.

Based on the site visits by the health officers, they claimed that the slaughterhouse was in good condition whereby there was no problem with slaughtering and poultry processing. Overall, the level of cleanliness at the slaughterhouse was satisfactory.

According to the chicken supplier, it was a common practice to vacuum-packed fresh meat once it is slaughtered and cut. By removing the oxygen helps to prevent spoilage and can keep the meat fresh. Referring to the background of the supplier, he has over 30 years of experience in the chicken processing field, which includes slaughtering and chicken handling. According to the supplier, slaughter man was not allowed to slaughter more than 20 chickens at one time. The slaughter man must remove the chicken feathers by batches to prevent the chicken from hardening that complicates the feather removing process. By performing these activities by batches, it eventually assists in quality monitoring of the chicken handling activities.

4.4.6 Subtheme 6: Inadequate Cooking Method

According to the interviewees, perishable foods such as fresh meat and poultry must be cooked to perfection to destroy any living microorganism in the food products. *Salmonella* is one of several dangerous bacteria that can be found in raw chicken. The subject added, meat and poultry must be cooked to a minimum of 80 degrees Celsius to kill the bacteria. Food that never reached the internal temperature of 80 degrees Celsius and bacteria that can cause foodborne illnesses may still be hanging around.

Contrasting to cooking, reheating cooked meat and poultry involve temperature of 80 degrees Celsius or above. The common misconception of the reheating process is

that it took a shorter reheating time compared to the cooking process since the product is already cooked. However, the reheating process needs the same amount of cooking time. This is because once the chicken is reheated to the recommended internal temperature, dangerous bacteria such as *salmonella* were eliminated. Besides, the chicken must be reheated the same way it was originally cooked.

There were few arguments on how the chicken were handled during the wedding banquet. First of all, the deep-frying method was an inadequate cooking technique for a large number of chicken pieces being dipped into the frying pan at one time. Frying those chickens in batches was considerable, however, dipping an average of 20-35 pieces together at a time for 20 minutes was considered an improper cooking technique as it was necessary to check the underside of each piece by lifting and turning it occasionally by using tongs. The time taken for frying each batch also considered insufficient for such amount of pieces. Longer frying time needed and those chicken also need to be lifted from time to time in ensuring the chickens were cooked thoroughly.

Secondly, using proper cooking equipment also an important aspect that often overlooked. Using an appropriate kitchen tool was essential not only for the convenient and fast cooking but also for the safety of the foods as well. Instead of using an ordinary metal spatula for lifting and flipping the chickens in the frying pan, a fan cover net was used as the dipping tool. It is an improper kitchen utensil used as the fan cover net limits the lifting and flipping each of the chicken pieces in making sure it was cooked perfectly. Therefore, it was highly suggested that wooden or metal utensils were the most appropriate tools to use because they do not leave any smell,

healthy, natural products, and most importantly able to flip and scraping the chicken pieces easily.

In essence, the villagers who involved with cooking and reheating the food process were recommended to use a metal stem or digital thermometer as a guarantee that the chicken has reached the safe minimum internal temperatures. The only way to be sure is with the help of a probe thermometer. Anyhow, with lack of temperature equipment must be troublesome for the villagers to gradually monitor on the foods' temperature. This is because food safety begins with proper cooking because no matter how good the cooks' vision is, one's cannot accurately determine if the food is completely cooked by depending on its colour solely. Therefore, the use of thermometers to check the temperature of the food, cover pans and stir food often to distribute heat evenly is important, especially when cooking in a large quantity. Besides that, knowing the proper cooking temperatures for each type of meat with appropriate thermometers is crucial to keep customers healthy.

Apart from that, the key element of working with food is to work quickly in small batches. Keep the rest of the food that was not working with either below 4 degree Celsius if it is cold, or above 60 degrees Celsius if it is hot food. Furthermore, the respondents also suggested to throw away foods that have been left at room temperature for an unknown amount of time. It could be unsafe to be eaten because harmful food pathogens may grow rapidly during leftovers. Nevertheless, keeping hot food hot is important because cooking in itself does not kill all bacteria, and bacteria resume growth if food is allowed to drop into the temperature danger zone.

Besides that, to ensure temperature safety, steam tables, soup warmers, and other hot holding units must be turned on and heated up before hot food is put into them.

As a conclusion, correct cooking temperatures, appropriate cooking techniques and storing freshly raw and cooked foods accordingly is vital in minimizing the risk of foodborne illness from the beginning of food handling. This is because bacteria can grow very rapidly as food transitions through the temperature danger zone.

4.5 Theme 2: Perception of Food Premises' Locations for Food Poisoning

Based on both interviews, both respondents agreed that consumers are most exposed to foodborne pathogen when having an outside meals. Stalls and restaurants were often claimed as locations of most frequent foodborne outbreaks occurred. Hence, consumers who choose to dine out rather than having dinner at home might give a second thought of it since many reports claimed that they were more likely to get exposed with food hazards when consuming foods at restaurants compared to foods prepared at home. The most common contaminants which caused the illness is *e-coli* and *salmonella*.

Nowadays, having an outside meals has become a modern lifestyle. Insufficient cooking preparation, tiredness, and getting home late were the most common reasons for modern parents to buy foods at stalls or restaurants to be served to their children. From the economic view, it is undeniable that the consumers' buying power has increased.

In addition, with the presence of 24-hour stalls and restaurants were also among the factors that makes the kitchen function smaller at home (Brunner, Van der Horst & Siegrist, (2010). It is not exaggerating to mention that the home kitchen only function during weekends. Even though take home food or dine out does make parents responsibilities lighter, but many of the parents were unaware that the taste of food or convenience should not be the main factor in the selection of children's food, yet its' nutrition values.

Besides that, the habits of having frequent outside cooked foods may also leads to health problems such as obesity, heart attacks, hypertension and diabetes to both parents and children. These health problems occurred when a balanced diet is difficult to maintain because of the unknown hygiene levels and the amount of additives used in making sure the foods taste delicious.

Apart from that, consumers' attitudes when choosing food premises by only considering on the low prices offered despite of cleanliness of the food premises may also put them into the risk of foodborne illness incidence. The respondents also warned the public not to take food poisoning for granted as the illness may cause death especially to children and elderly due to weak immune system.

4.5.1 Subtheme 1: Risk Factor of Eating at Stalls and Restaurants

Data from foodborne disease outbreaks suggested that eating foods prepared in restaurants are an important source of infection. It is an undeniable fact that food businesses have the responsibility to serve food that not only tastes good, having a

pleasant presentation but also to serve safe food to be eaten. However, the fact that many of the highest risks for food poisoning to occur were at chain restaurants.

Through the interviews, the respondents further elaborated on the risk factor of foodborne illnesses occurrences in restaurants. The respondent frequently stressed out that harmful bacteria such as *E-coli* were often associated with food service operators who neglected hygiene practices during the entire working shift. They may not wash their hands after using the washroom, picking up their nose, smoking while cooking or not covering their mouth when coughing whereby will contaminate the foods indirectly. *Salmonella*, on the other hand, usually was caused by cross-contamination between raw and cooked foods. Anyhow, both *e-coli* and *salmonella* can cause the most pathogen infections with severe diarrhoea and fever. Low immunization people like children, the elderly and those with chronic diseases who were infected could be deadly.

The fact that foodborne pathogens are invisible, foodborne illness is entirely unpreventable. The first respondent also added that foodborne illness signs and symptoms usually begin to appear several hours after eating contaminated foods or perhaps a few days later upon consumption. When asked upon the reason for frequent food poisoning incident, he mentioned that it happened due to the attitude of food service operators who neglected good hygiene practice while preparing, serving and selling foods.

Both the food premise owners as well as the food service operators often overlooked on the overall premise' cleanliness. He even added that they purposely exposed the

ready-to-served dished uncovered which attracts insects such as flies, cockroaches, and even rats into the premises. There was proof of flies, cockroaches and rats presence in the food premises upon inspection.

Flies are twice as germy as cockroaches. All those germs get transferred to their legs and small hair all over their bodies. It only takes a second for them to transfer those germs into the foods. It is also true that flies cannot chew. So to eat, flies spit enzymes on their food to dissolve it and slurp it up. And yet another truth is that flies carry cholera, tuberculosis, dysentery, and typhoid. Flies that are festering on food can makes whoever consumed it sick. So, if there were a bunch of flies feeding on uncovered foods, you probably should not eat it. But when they land on food for a few seconds, it is unlikely that it will transfer enough bacteria to make you sick. The bacteria that stuck on its body that spreads disease and makes people sick.

On the other hand, flies caused serious diseases in humans. Common houseflies can carry some dangerous pathogens. The laboratory results found that at least 5 bacterial species that can cause illness ranging from food poisoning to respiratory infection. Flies may transmit bacteria through their food liquefying process of defecation. Flies were most attracted to uncovered foods and restaurants dumpsters. He reminded food service operators to cover food at all times. And also a little advise to consumers, please stay alert when dining out. Consumers should ever be vigilant with the food and make sure that if you go to a restaurant with flies around, please tell the owner to take necessary measures to control the flies.

Furthermore, rats were significant as food poisoning vectors namely *salmonellosis*. The disease can be passed from eating food contaminated by the urine or faeces of an infected rodent but it is typically caused due to the animal's bite and sometimes an infection from the bite can be fatal. It can be cured with treatment, but if left untreated, a rat-bite fever could be fatal. The symptoms occurred between 3 to 10 days after exposure, however, they can be delayed up to several weeks.

The respondent further added that food poisoning could be avoided if customers boycott dirty food premises. If the food service operators do not look after themselves and their premises, they are unlikely to look after the served foods as well. If having doubts about the safety of the foods, avoid it. Kindly contact the local council if there have been serious concerns with the way the food is handled, prepared, stored, or cooked in the food business.

Besides that, there also has been a recent increasing trend of having an outside food. Upon further questioning, the consumers were fully attracted by a huge size rat that hovering around the food premises. Apparently, the rats were the centre of attention that attracts the customers having meals there. The respondent added, some patients were infected by this bacteria. This is because roadside stalls do not clean and keep their utensils properly. Therefore, no one knows how the presence of rats at the stall could be harmful to humans' health. Besides that, both of the respondents shared the same view and expressed that most of the food poisoning is rodent or pest-free. This can be prevented if consumers stop eating out or at least pick and choose a clean dine-in restaurant. Therefore, it was clearly shown that dirty stalls and restaurants can pose a significant risk to food poisoning episodes.

4.5.2 Subtheme 2: Schools and Universities Cafeterias also at Risk

Every day, hundreds of kids lining up at the school cafeteria for lunch and parents place their trust in the food service operators that prepare lunch as part of their school routine. According to both respondents, early serving time, cross-contamination and hygiene cleanliness often contributes to the high incidence of food poisoning in school cafeterias. It takes several precaution steps to get good food from farm straight to the dining table. However, because bacteria and viruses are barely seen by eyes, contamination can occur at any point along the chain.

Several investigations were carried out with food poisoning cases involving schools. Initial investigation revealed that pesticides and dry foods were mixed together that caused contamination on the food served. As a result, the children and teachers who consumed the contaminated foods at the school cafeteria were down with food poisoning symptoms.

Besides that, the investigation also revealed that there has been a severe time and temperature abuse on the served foods. For instance, the foods were served way too early than the actual serving time which allows the foodborne pathogens to grow rapidly in danger zone. Apart from that, there were also cases whereby the utensils were not cleaned properly, unsafe sources, contaminated raw food items, improper food storage, poor personal hygiene during food preparation, inadequate cooling and reheating of food items and a prolonged time-lapse between preparing and consuming food items were mentioned as contributing factors for outbreak of foodborne diseases at school cafeterias.

Food poisoning involving school cafeterias is serious. Therefore, as prevention measures, the Ministry of Health Malaysia will issued either verbal or written warning to food service operators with food poisoning history cases involving school canteens. As a result, food service operators' tenders at any school canteen with food poisoning cases will be terminated immediately. The drastic action was taken to prove that foodborne illness is not a minor issue. The clause for termination of service will be revised as a new term in the contract of appointment for food service operators (Bernama, 2016).

4.6 Theme 3: Attitude of Food Service Operators Essentials to Food Poisoning

Foodborne outbreaks often associated with food service operators. This is because the culture and attitude in the kitchen will affect their behaviour. In accordance with the interviewed respondents, several key aspects can be demonstrated to food service operators to reduce food-related illnesses. This includes encouraging favourable attitude, improve the food safety training module and most important is moral support from the management to boost their motivation in kitchen performances. These are based on the assumption that knowledge, attitudes, and practices can change one's behaviour.

In most scenarios, the food service operators have had good knowledge of food safety as they were compulsory to attend a food handling course, however with their bad attitudes in handling foods could expose the customers with food poisoning. During the interview, both the respondents exposed that food service operators' attitude was the major factor that often contributes to food poisoning. This is because

food service operators act as main vehicles for foodborne disease. They were the person in charge of handling the entire process of food production from the raw meats up till ready-to-eat foods. In other words, they were associated with the transmission of pathogens at every stage of food handling processes. Therefore, with a bad attitude in handling foods, the risks of getting contaminated meals is a definite high.

4.6.1 Subtheme 1: Culture Differences and Behaviour of Immigrants Cook

In order to have an effective food hygiene training program, the food service operators' behaviour must first be understood, followed by their beliefs and level of knowledge. Eventually, these three elements assist in increasing the effectiveness of educational materials used in the training. Apparently, the Malaysian food industry players no longer dominated by the native people but instead, there is a growing number of immigrants who competing in the industry as well.

Globalization, has also increased the number of immigrant workers in Malaysia. The immigrants had supported Malaysian infrastructures and physical development since three decades ago. Therefore, the number of registered immigrant workers has increased drastically from 532,000 in 1993 to 1.6 million in 2012 (Ministry of Finance, 2013). Generally, the immigrants were in manufacturing, construction, plantation and agriculture sectors. However, due to the high demands in food and beverages, the immigrants have also been employed as one of the strategies to minimize the cost in the food industry (Yee & Yuen, 2014). As the results of the immigrants' employment in the food industry, there have been increasing numbers of newly operated restaurants within a short period. Despite the growth, these

immigrants need to instilled appropriate food handling practices based on Malaysian food safety standards in ensuring healthy and safe food consumption (Rajagopal, 2013).

Despite the challenges in the adaptation of the immigrants' workers in the Malaysian food industry, the immigrants' food service operators, however, were viewed as the potential cause for the rise in typhoid cases in Malaysia. The problem occurred whereby the immigrants' food service operators refused to undergo vaccination and not medically screened which exposed them to be the disease carrier.

Upon interview, the respondents revealed that majority of immigrants' food service operators who touches foods were found to have a potentially higher risk of causing a fatal food poisoning. This is because the immigrants have high levels of pathogen bacteria since they were not having typhoid shot. Besides that, majority stalls and restaurants operated by the immigrants were not sanitized, not operating within a clean environment, often overlooked on the self-cleanliness as well as having longer operation hours. The respondents then continued saying that the temporary closure of premises runs by immigrants' food service operators was insufficient and the government needs to thoroughly look into this matter systematically as a means to prevent foodborne incidence.

Apart from that, the local authority and immigrants interactions were tough in regards to language and culture barriers. The immigrants were compulsory to runs the food premises according to Malaysian food safety standards since they were operating their business in the Malaysian country. They should not be influenced by

the culture from their origin which neglected cleanliness and improper food handling practices. In order to sustain their food business here in Malaysia, the immigrants should at least follow all the stated rules and regulations in Malaysian food safety standards. The respondents also expressed their concern about local customers who supports immigrants business despite the unhygienic food preparation and dirty stalls.

Despite the emerging food safety issues concerning immigrants' food service operators who often neglected food hygiene practices, the government will reconsider on foreign workers' recruitment in food industry sectors. The government through the Ministry of Human Resources suggested that those immigrants will be replaced by local workers to overcome the dependence of foreign workers thus to ensure the quality of food is assured (Berita Harian, 2018b). However, all food premises owners are responsible for making sure only local chefs were allowed working in their restaurants. The new regulation will be effective from 1st January 2019 (Bernama, 2018).

4.7 Theme 4: Age does make a Difference in Survival Rate

Anyone can be affected by food poisoning, but some people are more likely to get sick because their bodies cannot fight germs as well. This is because food poisoning is an unpleasant experience for anyone. These are the groups of people with a higher risk for food poisoning:

- a) Adults aged 65 and older,
- b) Children younger than 5 years,
- c) People with weakened immune systems, and

d) Pregnant woman.

Older adults have a greater foodborne risk because at the age of 65 and older, most of the elderly have been diagnosed with one or more chronic health conditions such as diabetes, cancer, kidney failure, heart attack, low blood pressure and they are usually on medication and undergo hospitalization. At this age, the elderly's immune systems and organs do not recognize harmful germs and they are not capable to get rid of those germs as well as they once did during their prime time. Therefore, these factors may weaken their immune systems thus causing the elderly more vulnerable to foodborne risk.

On the other hand, children younger than 5 years old posed a higher risk of food poisoning since their immune system is still developing. Compared to adults, infants' body systems are resistant to bacteria and viruses. Most of their vital organs such as heart, liver, and kidney have not been fully developed and the slow release of toxic substances from the body can lead to greater toxicity than adults. Therefore, foodborne illness can result in long term health consequences and even death, especially in young children. Often, the biggest threat to food poisoning is dehydration because the victim will experience severe fluid loss due to vomiting and diarrhoea – which was experienced by the deceased referring to the case study.

Meanwhile, *salmonella* also has the potential risk to cause a miscarriage and premature delivery to pregnant women. During pregnancy, food poisoning can cause even more anxiety due to vomiting, nausea, morning sickness or diarrhoea. Besides that, food poisoning experienced by the pregnant may be harmful to the baby as it

may cause infection or death to the new-born. In severe cases, severe dehydration can trigger early labour. Therefore, it is crucial to have a safe food consumption to avoid any unwanted scenario.

To conclude, food poisoning cases are very serious issues. It may seem like an easy theory and concept written on a piece of paper. However, the real truth is that the implementation is so complex and involves various forms of individuals such as the industry experts, private organizations, food industry players as well as the suppliers to act together with the goal to prevent foodborne illness as well as to protect consumers' health as a whole.

4.8 Food Safety Management System (FSMS)

There are many ways food can be put at risk and made unsafe to consume which in turn can lead to food poisoning. Food poisoning is an unpleasant condition and it is very serious and can also be fatal especially to pregnant women, infants, and the elderly. Therefore, the risk of getting food poisoning should be monitored at the lowest possible risk by implementing Food Safety Management System (FSMS).

The implementation of FSMS provides an approach to minimize the risk of food safety incidents by determining, preventing and eliminating food safety hazards. FSMS is a program that makes use of a scientific and systematic approach to maintain food premises and food businesses comply with food hygiene regulations to provide food that is safe for human consumption. In Malaysia, there are various certifications listed under FSMS depending on the business endeavours. The implementation of FSMS benefits food businesses in minimizing wastages, optimize

efficiency, a form of quality assurance and also assist in increasing brand and product confidence to end consumers.

4.8.1 Bersih, Selamat dan Sihat (BeSS) Recognition

BeSS recognition is also one of the government's initiatives to curb food safety issues, concerning food service operators in the food premises. It is a recognition given by the Ministry of Health Malaysia to food service operators with the means to encourage the provision of practicing safe and healthy food for customers. This is a program that has been improvised and upgraded by the previously existing certification program implemented by the Ministry of Health Malaysia which in line with the government's objective to promote a healthy lifestyle for the people.

Referring to the interviewed respondents, there were four key elements to be executed by food service operators accordingly before being recognized with BeSS. The criteria include maintaining a hygienic food premise, safe food preparation and handling, provide healthy food and proper serving portions according to individual needs. The range of food premises that qualifies for BeSS recognition covers from the market, food stall, hawkers, food truck, food court, restaurants, cafeteria, canteen and also catering services. In order to ensure that the food service operators always adhere to the elements of BeSS recognition, monitoring will be conducted periodically. The first respondent also mentioned that a wise consumer will always consider food premises with BeSS recognitions as dining options because the premises promise safe and quality foods.

“Consumers should be wise in choosing a place to eat. The environment of the premise must be clear from animals carrying

diseases. Preferably, choose premises with BeSS logo because the recognition guarantees safe and quality foods served.

– Interviewee #1

4.9 Summary of Reporting Qualitative Phase

Based on the analysis performed in the qualitative phase, the summary of the present study's finding is shown in Table 4.1. From the above elaborated qualitative result analysis, the present study pointed to the fact that food service operators is crucial to the event of food poisoning episodes that occurred in Kedah. This is because food service operators act as main vehicles for foodborne disease. They were the person in charge of handling the entire process of food production from the raw meats up till ready-to-eat foods. In other words, they were associated with the transmission of pathogens at every stage of food handling processes. Therefore, with a bad attitude in handling foods, the risks of getting contaminated meals is a definite high. Besides that, the analysis also revealed that there is a significant relationship between food service operators and food safety compliance.

Thus, the present study will develop a quantitative phase in analysing the relationship between food service operators and food safety compliance. From here, the researcher is going to test the hypotheses based on KAP model.

Hypothesis 1: There is a significant relationship between food service operators' knowledge and food safety standard compliance.

Hypothesis 2: There is a significant relationship between food service operators' attitude and food safety standard compliance.

Hypothesis 3: There is a significant relationship between food service operators' hygiene practices and food safety standard compliance.

Table 4.1: Summary of Propositions Testing

	Research Questions	Propositions	Findings
RQ1:	What has been the consequences of food poisoning incidence to the food business?	There are several impacts of food poisoning incidence to the food business.	Supported
RQ2:	Who has the operational responsibility to ensure the food produced is safe for human consumption?	Food service operators hold the operational responsibility in making sure the food produced is safe for human consumption.	Supported
RQ3:	Why do the cases of food poisoning incidents keep increasing despite the establishment of Malaysian food safety standards?	The unfavourable attitude of food service operators that contribute to food poisoning incidents.	Supported
RQ4:	Do the existing Malaysian food safety standards support/assist food service operators in conducting food preparation processes?	Malaysian food safety standards is comprehensive that it should be assisting food service operators in daily business operation.	Supported

Phase 2: Reporting Quantitative Results

Compared to the qualitative study, quantitative data is numerical. It deals with numbers, temperature, height, and everything measurable. Thus, a summary of the collected data in the present study was represented and further explained in the next section.

4.1 Quantitative Data Description

As mentioned earlier in previous chapters, all registered food premises in Malaysia were categorized as a population in the present study. In accordance with the data collected from the Ministry of Health Malaysia, stated that a total of 3,108 food premises were registered with the Food Safety and Quality Division, Ministry of Health Malaysia as of April 2018. Out of that total population, 341 food premises were distributed with a self-administered questionnaire survey. 341 were the sample size for the 3,000 population in the present study as suggested by Krejcie and Morgan (1970). The table for determining sample size as recommended by Krejcie and Morgan (1970) were attached in Appendix F.

In regards to the questionnaire distribution method, the researcher applied a simple random sampling technique that represents the population. The researcher personally sent and collected all the distributed questionnaires in Kedah's district including Kulim, Sungai Petani, Gurun, Yan, Alor Setar, Jitra, Kubang Pasu, Sintok and Changlun. The researcher left the questionnaire at the respondents' food premises for approximately two (2) days before collected it back from them. By doing this, it also provides time and comfort for respondents to answer the questionnaire. After the duration of these two months of data collection, a total of 320 questionnaires were

completed and collected by the researcher. This has impacted the response rate of 105.6% as shown in Table 4.4.

Referring to the explanation as indicated previously, food premises in Malaysia were categorized as a population for the present study. Table 4.2 describes the classification of food premises with BeSS and non-BeSS recognition whereas Table 4.3 displays the ratio between BeSS and Non-BeSS recognition in Kedah as of April 2018. These data were crucial in determining the sample size of the study as proposed by Krejcie and Morgan (1970).

Table 4.2 Classification of Food Premises with BeSS and Non-BeSS Recognition in Kedah as of April 2018

Food premises with Non-BeSS recognition	2,993
Food premises with BeSS recognition	115
Total Food Premise Registered as on January 2018	3,108

Table 4.3: Ratio between Food Premises with BeSS and Non-BeSS Recognition in Kedah as of April 2018

Food premises with BeSS recognition	13
Food premise with Non-BeSS recognition	328

4.2 Respond Rate

For data collection purposes, a total of 360 sets of self-administered questionnaires were distributed to randomly selected food service operators who run food premises in Kedah. The actual data collection process for the quantitative phase took approximately 2 months which started in May 2018.

The initiative of leaving the questionnaire survey at the respondents' working place for two (2) days turned out to have a very positive response from them, as this action provides ample time and comfort to respondents in answering the questionnaires whenever possible. This is because working at food premises can be very hectic especially during peak hours.

Out of these 360 sets of questionnaires, only 241 sets were returned with complete answers, which gave an effective response rate of 70.7%, with 40 missing cases. The usable questionnaires were coded and analysed accordingly. The sample size obtained was adequate to run the analysis by using an IBM SPSS version 2.1 software. Table 4.4 illustrated the response rate and total of a usable questionnaire for the present study.

Table 4.4: Summary of the Total Questionnaires and the Response Rate (n=341)

The sample size of the study	341
Total distributed questionnaires	360
Returned questionnaires	320
Returned and usable questionnaires	241
Returned and unusable questionnaires	79
Non-returned questionnaires	40
Response rate	105.6%
Effective response rate	70.7%

As indicated by Allen (2017), the response rate in survey research refers to the number of people who answered the distributed surveys divided by the people in the research sample. It is a mathematical formula that was calculated as a tool to understand the degree of success in obtaining completed answered questionnaire surveys, and usually expressed in the form of a percentage. With reference to the above table, 70.7% was an effective response rate obtained for the present study. In

accordance with research done by Johnson and Wislar (2012), a higher response rate will produce findings that were more representative of the population of interest. Thus, the response rate of the present study is satisfactory.

4.3 Pre-Analysis

Before proceeding with any research data analysis, a pre-analysis study should first be executed. Therefore, each variable was reviewed from the aspect of normality assumption, missing values, outliers and linearity (Coakes & Steed, 2009). Subsequently, a validity and reliability testing were performed through IBM SPSS version 2.1 software.

4.3.1 Data Screening and Cleaning

In the present study, the researcher performed a pre-analysis before conducting the actual research data analysis. Firstly, all the questionnaires were collected and the answers were transferred into an IBM SPSS version 2.1 software. Next, the researcher performed data screening and cleaning because according to Pallant (2005), this stage is crucial as it helps the researcher to identify any missing values or errors from the collected data. Besides, data screening also enables the researcher to determine whether the entered data were within the scale range used in the present study or otherwise. The summary of case processing values also able to disclose the minimum, maximum, valid and missing values of each item in the present study. As a conclusion, there were no missing and out of range values in the present study upon performing the data cleaning process.

4.3.2 Missing Value Analysis

Missing values often occurred when respondents do not answer or disclosed when it comes to sensitive matters. For instance, income. Missing values may result in systematic biases. However, there were ways to learn from missing values. Anything blank by default was considered missing in SPSS and technically the researcher would not have to do anything with it. The researcher could leave it as it is and it would be omitted from any analysis she might pursue later.

Multiple reasons might have caused missing values during the data collection process, especially when collecting data via a self-administered questionnaire survey. Missing values happened maybe because the questions were not valid, or illogical that the respondents skipped over that questions that the respondents could not answer (Sekaran & Bougie 2016). Or maybe, the researcher herself might accidentally hit the keyboard and deleted something that she did not mean to delete because accidents happen. However, in the context of the present study, 79 cases or questionnaires were declared as the missing value which has directly impacted the total usable cases from 320 cases to 241 cases only. (Refer to Table 4.4).

4.3.3 Univariate Outliers and Bivariate Analysis

Another data screening procedure that can be very important is to screen for outliers in the data. For these reasons, the researcher had performed univariate outliers and bivariate analysis. Each of the variables in the questionnaire has been reviewed in terms of its outliers for the observations which valued too different from the other observations.

There were few methods applied in the present study with the means of detecting univariate outliers. One of the methods applied was by visually inspect the data through a frequency distribution. Mild and extreme outliers can be detected by using a box plot, whereas bivariate analysis was performed by using a scatter diagram with independent variables against dependent variables. Both box plot and scatter diagram techniques were performed for univariate outliers and bivariate analysis as suggested by Coakes and Steed (2009) and Hair et al. (1998).

Table 4.5 illustrates the cases of each variable with outliers observation and extreme outliers found by using a box plot, whereas Table 4.6 summarized the findings from the visual observation on the scatter diagram for the present study research framework.

Based on the visual observation, it was found that, none of the cases having frequent repetitive outliers in the box plot. In a similar situation applied in the scatter diagram, none of the cases were repeated. There was no sign of extreme outliers' seen in both tables. To conclude, the cases of extreme outliers in this study were not severe. Therefore, all of the total of 241 cases in this study are acceptable for further analysis.

Table 4.5: Checking Outliers and Extreme Observations Using a Box Plot

Variable	Upper Value	Lower Value
Level of Food Safety Compliance	None	73, 106, 151
Knowledge of Food Service Operators	None	16, 58, 138, 224
Attitude of Food Service Operators	23, 68, 69, 130, 159, 191, 194, 202, 213, 214	None
Hygiene Practice of Food Service Operators	None	33, 156, 158

Table 4.6: Checking Outliers and Extreme Observation Using a Scatter Plot

Variable	Upper Value	Lower Value
Food Safety Compliance vs Knowledge of Food Service Operators	28, 112, 154	34
Food Safety Compliance vs Attitude of Food Service Operators	78, 111	179, 125
Food Safety Compliance vs Hygiene Practice of Food Service Operators	93, 190	125

4.3.4 Normality Test

A normality test is a statistical process used to determine if a sample data fits a standard normal distribution. It was the basic assumption of a multivariate test which refers to the shape of the distribution of each variable in the present study. The present study performed normality test to check whether or not the data is normally distributed before the researcher proceeds to the next phase of data analysis. This is because the assumption that the data is normally distributed is crucial for ANOVA analysis of the hypotheses testing working correctly. In other words, the researcher needs to ensure the data is normally distributed before using the normal distribution. Both univariate and bivariate test results will be accepted when the variable distribution form was normal.

Normality tests can be performed either mathematically or graphically which includes histogram, skewness and kurtosis, probability plots and chi-square goodness of fit. In the present study, the characteristics of normality were tested using skewness and kurtosis. Results of statistical skewness and kurtosis for this study as shown in Table 4.7.

Table 4.7: Skewness and Kurtosis Results for Normality Test ($n=241$)

Variable	Skewness	Kurtosis	Distribution Description
Food Safety Compliance	-0.421	0.391	Normal Distribution
Knowledge	-0.369	0.354	Normal Distribution
Attitude	1.097	1.004	Normal Distribution
Practice	0.061	-0.244	Normal Distribution

***Significant at p value of 0.01

** Significant at p value of 0.05

* Significant at p value of 0.1

By referring to the above Table 4.7, it was indicated that the data for the present study were normally distributed, as the skewness values were between -0.421 and 1.097, whereas kurtosis values between -0.244 and 1.004. This is in accordance with Hair et al (1998), who emphasized that the acceptable values for both skewness and kurtosis to be considered as a normal curve were between -1.96 or above +1.96, normality can be deducted at the probability level of 0.05, or if the ratio was less than -2.58 or above +2.58, normality can be deducted at the probability level of 0.01. However, the data was considered abnormal and problematic when the skewness and kurtosis values exceeded 3.0 and 10.0 respectively. Therefore, based on the above

argument, the researcher concluded that all of the variables in this study having a normal data distribution based on Hair et al., (1998).

4.4 Demographic Profile of Respondents

This section comprises the profile of respondents who participated in the present study. The purpose of collecting demographic profile of each respondent was to seek basic information of the subjects and thus assist the researcher in interpreting the results of the analysis. Besides that, a demographic study was performed to investigate and determine the relationship of food service operators' background with the theoretical KAP level about food safety. It was expected that food service operators from various backgrounds able to achieve a satisfactory or excellent level in the KAP assessment. A descriptive analysis will provide statistical information on the data gathered. For instance, frequency, mean and standard deviation. Table 4.8 presents the details of the demographic profile of respondents.

In regards to religion, majority of the respondents were Muslim which represents a total of 95.4% from the total respondents, followed by Buddha, Christian, and Hindu with 2.5%, 1.2%, and 0.8% respectively.

In terms of the age range, it was categorized based on generations. According to Quine, and Carter (2006), baby boomers were born between 1946 and 1965; whereas individuals born between 1966 and 1976 were identified as Generation X, and Generation Y or Millennium refers to individuals who born between 1997 and 1994. Therefore, the age group for the present study was categorized as below 20 years old; 21 to 30 years old; 31 to 40 years old; 41 to 50 years old; 51 – 60 years old; 61 years

old and above. Majority of the respondents were at the age of 21 to 30 years (44.8%), followed by the age group of 31 to 40 years old and 41 to 50 years old, making up 21.6% and 17.0% of the respondents, respectively. In this study, the oldest respondents were at the age of 75 years old whereas the youngest respondents were at the age of 18 years old.

In terms of educational qualifications, a total of 131 respondents were secondary certificate holders, followed by 49 Diploma holders, 36 Bachelor's degree holders, 21 primary certificate holders, and only 4 respondents without any school certificate.

Moving on to respondents' experience in the food industry, the result revealed that majority of 97 respondents with 40.2% have a working experience for more than 5 years, considered as experts, followed by 91 respondents (37.8%) within 2-5 years of working experience. The remaining 53 respondents have been working in the food industry for less than a year.

Apart from that, from the demographic analysis, the result showed that only 53.9% of the respondents participated in food handling training organized by registered Food Handler Training Schools (FHTS). The remaining 111 respondents (46.1%) stated that they had never participated in any food handling training organized by the Ministry of Health Malaysia throughout their involvement in the food industry.

On the other hand, it was rather at a disappointing level to discover the number of respondents that never noticed on the existence of BeSS recognition for food premises at surprisingly high percentage of 62.7% (151 respondents). However, a

total number of 122 respondents (50.6%) felt that BeSS recognition is equally important for the food premises. Last but not least, the data also observed that majority of the respondents have had their typhoid injection with a total number of 180 responds (74.7%).

Table 4.8: Descriptive Analysis of Respondents ($n=241$)

Variables	Category	Frequency	Percentage
Gender	Male	83	34.4
	Female	158	65.6
Religion	Islam	230	95.4
	Hindu	2	0.8
	Buddha	6	2.5
	Christian	3	1.2
Age Range	Below 20 years old	24	10.0
	21 – 30 years old	108	44.8
	31 – 40 years old	52	21.6
	41 – 50 years old	41	17.0
	51 – 60 years old	10	4.1
	61 years old and above	6	2.5
Highest Education Level	Primary school	21	8.7
	Secondary school	131	54.4
	Diploma	49	20.3
	Bachelor's degree	36	14.9
	No education	4	1.7
Experience in Food Industry	Less than 1 year	53	22.0
	2 – 5 years	91	37.8
	5 years and above	97	40.2
Participation in food handling training	Yes	130	53.9
	No	111	46.1
Awareness on the existence of "BeSS" recognition?	Yes	90	37.3
	No	151	62.7
Do "BeSS" recognition important to you?	Yes	122	50.6
	No	119	49.4
Typhoid injection	Yes	180	74.7
	No	61	25.3

4.5 Data Analysis of Descriptive Statistics

The descriptive analysis of respondents was visualized in a pie chart. A pie chart generally used to show the percentage that displays the classification of ordinal and nominal categories. Each slice of the pie chart is proportional to the quantity it represents in the present study.

4.5.1 Gender

With reference to Figure 4.1, the result exposed that female respondents dominated the survey by 66% whereas only 34% represents male respondents. From the figure, it was revealed that majority of food service operators in Kedah runs by females representing 66% of the sample size while restaurants were the least operated by males in Kedah with only 34% of the sample size. The results indicated that food business provides more job opportunities to be conquered by women.

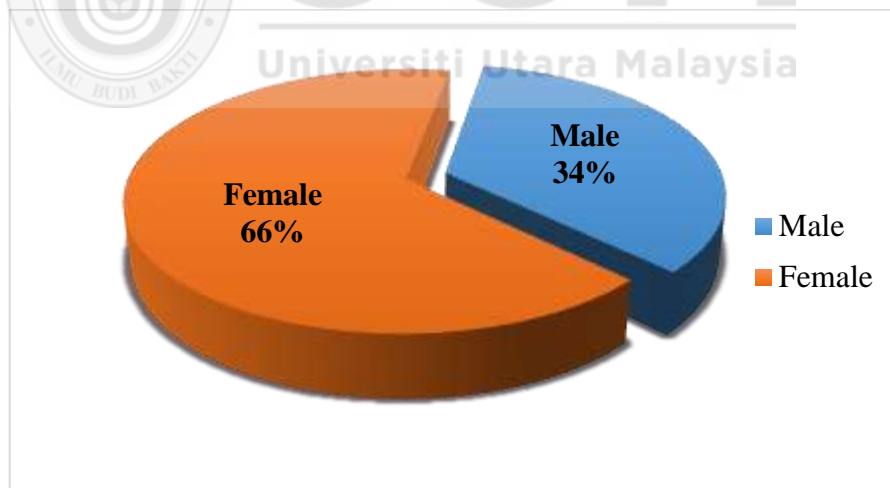


Figure 4.1 Gender

4.5.2 Religion

In accordance with data collected in Table 4.8, the results revealed that majority of food service operators in Kedah were dominated by Muslims with 95% followed by

Buddhists with 3%. The huge difference of Muslim food premises compared to the other religions proved that Malaysian most preferred to consume halal food products. This is because halal foods not only good for physical but also for spiritual health development.

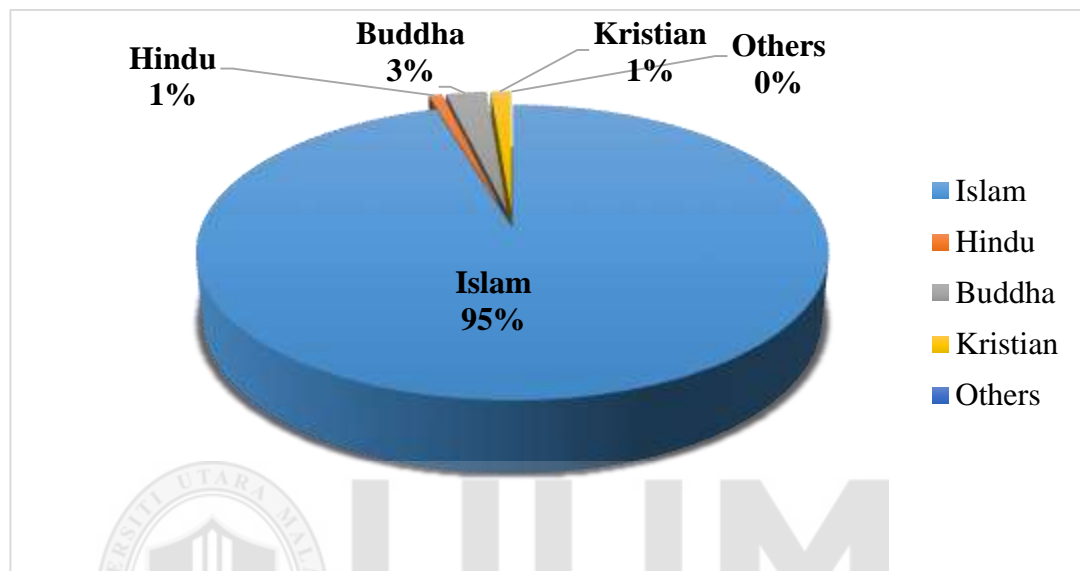


Figure 4.2: Religion

4.5.3 Age Range

Data in Figure 4.3 revealed that the major group of 45% of the participants were between 21-30 years of age, and 66% were females. This is the most ideal age to start a career. By starting a business at this young age, they were fully committed, having more energy and motivation in maintaining the relevance in food businesses in the next 10 years. Besides, young entrepreneurs were more easily adapt to any business culture compared to the older generations.

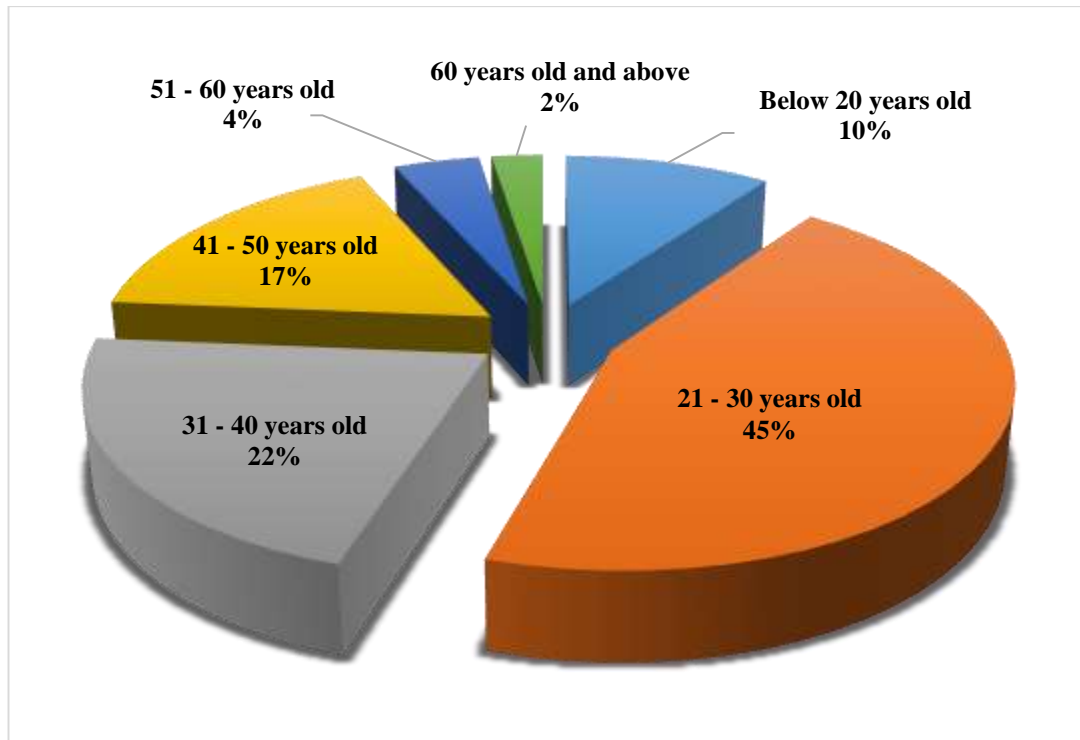


Figure 4.3: Age Range

4.5.4 Highest Education Level

As indicated in Figure 4.4, the secondary level indicated the highest percentage of education level among respondents with 54% followed by 20% of those with Diploma holders. Only 2% of the respondents without formal education. The result is parallel to a study by Lues and Van Tonder (2007) who reported that 74% of food service operators were knowledgeable. However, Dajaan et al., (2018) revealed that most of the respondents were lack of basic education which is in contrast with the present's study result.

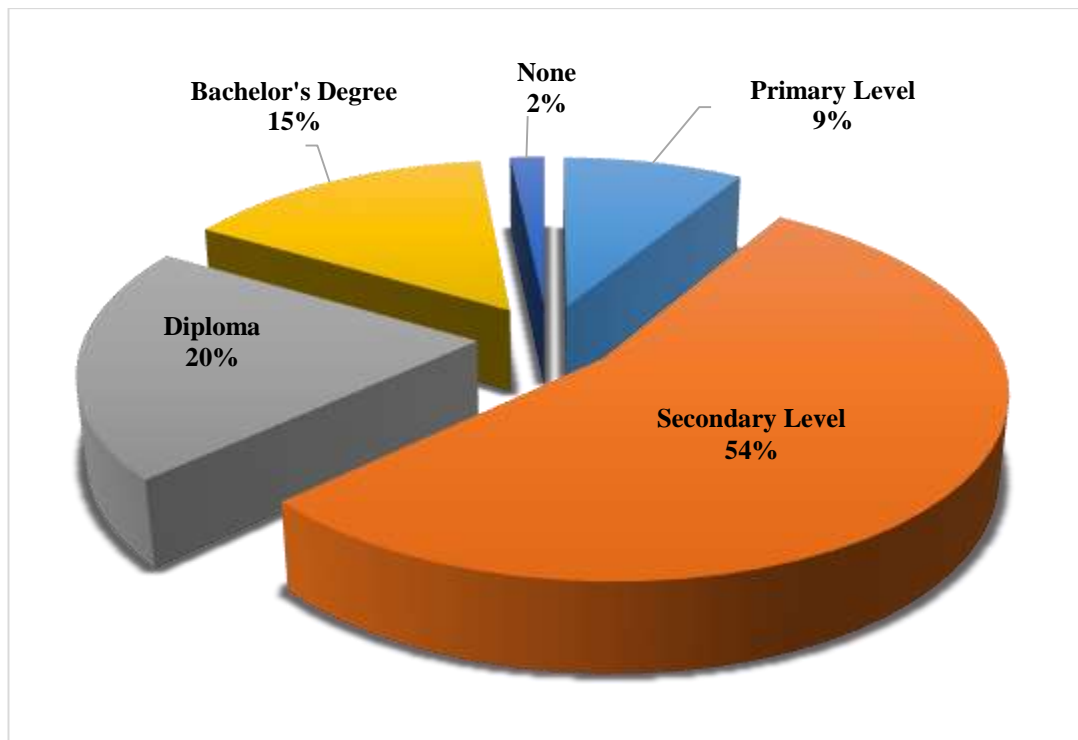


Figure 4.4: Highest Education Level

4.5.5 Experience in Food Industry

Figure 4.5 explained that approximately 40% of the participants having a working experience of more than 5 years in the food industry. Participants with 2-5 years' experience in food businesses represent 38% of the total respondents whereas 22% represents food service operators with less than 1 years of experience.

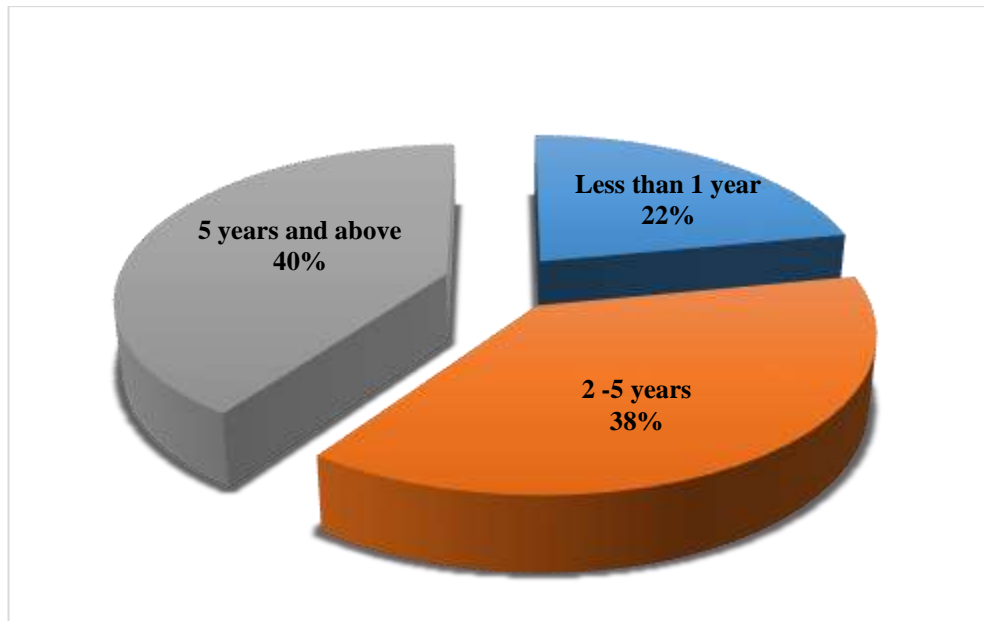


Figure 4.5: Experience in Food Industry

4.5.6 Participation in Food Handling Training

Finally, Figure 4.6 exposed the percentage of food service operators' participation in food handling training. Based on the chart, 54% of the food service operators have had their formal training on food handling with 75% had their typhoid vaccination injection. However, 46% of the respondents were lack of formal food handling training. It shows that approximately 46% of food service operators in Kedah were non-compliance with Food Hygiene Regulation 2009 which clearly stated that only employs workers who had undergone a food handling training and been medically examined and vaccinated. The situation can be concluded that the food premises' owners were irresponsible on the food safety training awareness of current legislative requirements.

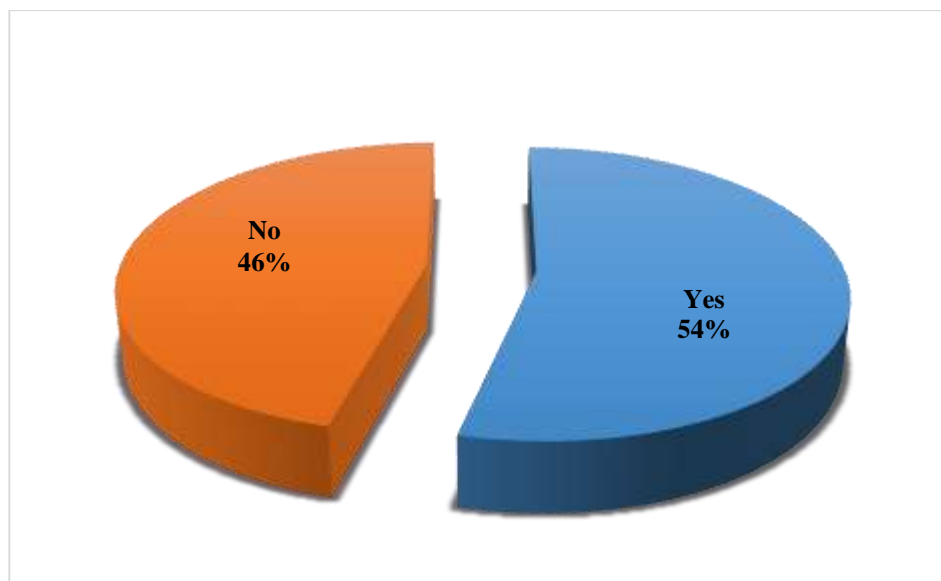


Figure 4.6: Participation in Food Handling Training

4.5.7 Awareness on BeSS Recognition

In regards to respondents' awareness on BeSS recognition, majority of 63% of the total respondents had not heard and not aware of the recognition existence as shown in Figure 4.7. An indication that food service operators in Kedah were aware of the certification existence could be due to their exposure to both formal and informal education as shown in Figure 4.4 which 54% of the respondents with secondary education level. However, only 37% of the total respondent have had awareness of the BeSS recognition.

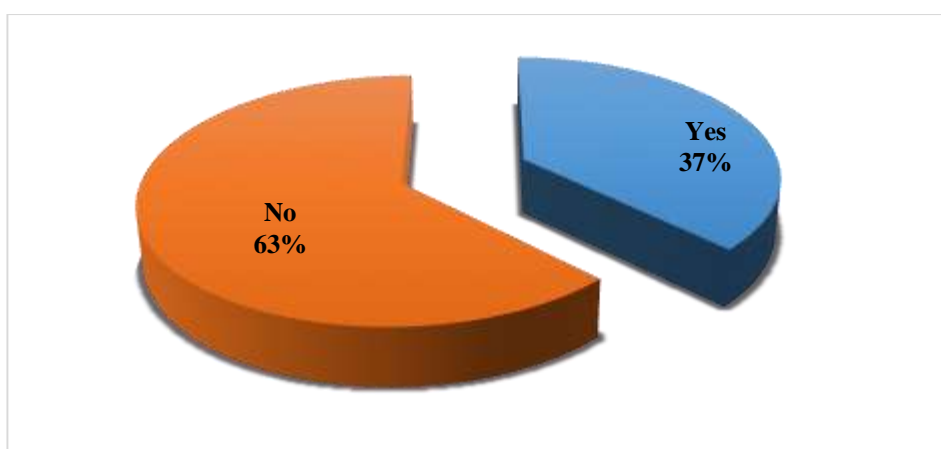


Figure 4.7: Awareness on BeSS Recognition

4.5.8 Importance of BeSS Recognition

Comparatively, the analysis of food safety certification among food service operators in Kedah was relatively high. A majority of 49% of the respondents felt the unimportance of having any food safety certification while running food business while the remaining 51% felt the advantages of having certification in the food business. By only relatively small differences between those who felt the importance of food safety certification and with who felt otherwise, thus, this situation showed both good and bad indication from the enforcement agencies. However, this result indicates the need for reviewing and revising Malaysian food safety surveillance as well as on the enforcement of legal and food hygiene practices among food service operators. This will be a means to ensure the real needs of established food safety certification.

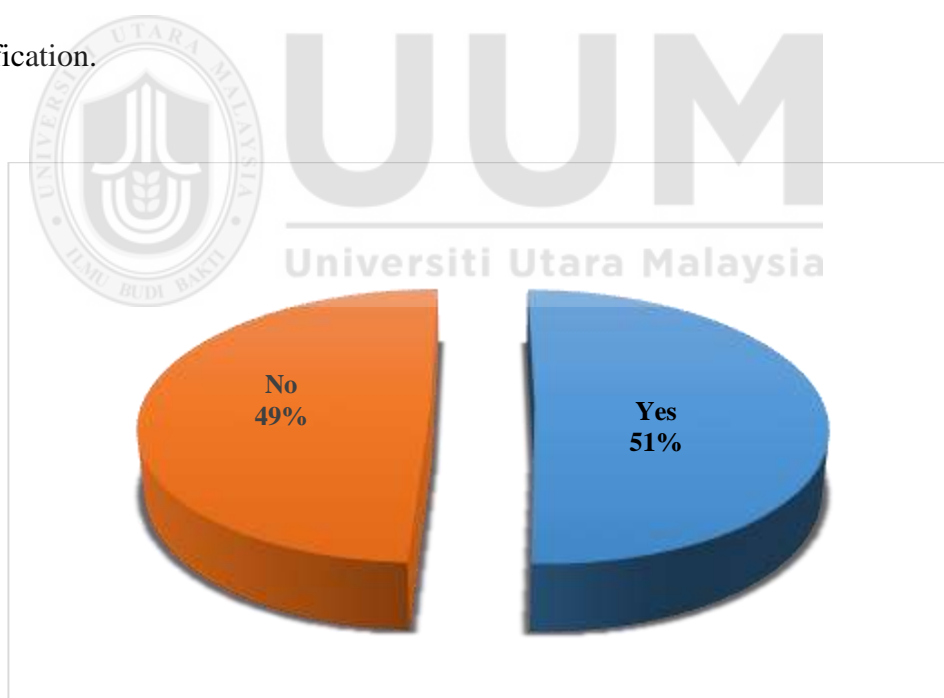


Figure 4.8: Importance of BeSS Recognition

4.5.9 Typhoid Injection

In regards to typhoid injection as shown in Figure 4.9, majority of the sample size has had their typhoid vaccination shot (75%). However, it was surprising to reveal

that 25% of the respondents had never receive any vaccination shots throughout the involvements in the food industry. The major concern for vaccination refusal may be due to religious beliefs and doubt of content (Smith, 2017). The consequence of a drop in vaccine shot has increased foodborne outbreaks. However, the refusal is just an assumption on the vaccine hesitancy problems in Malaysia. It is a concern of food service operators who failed to have their vaccination shot while working in a food premise because they might be the carriers of the disease.

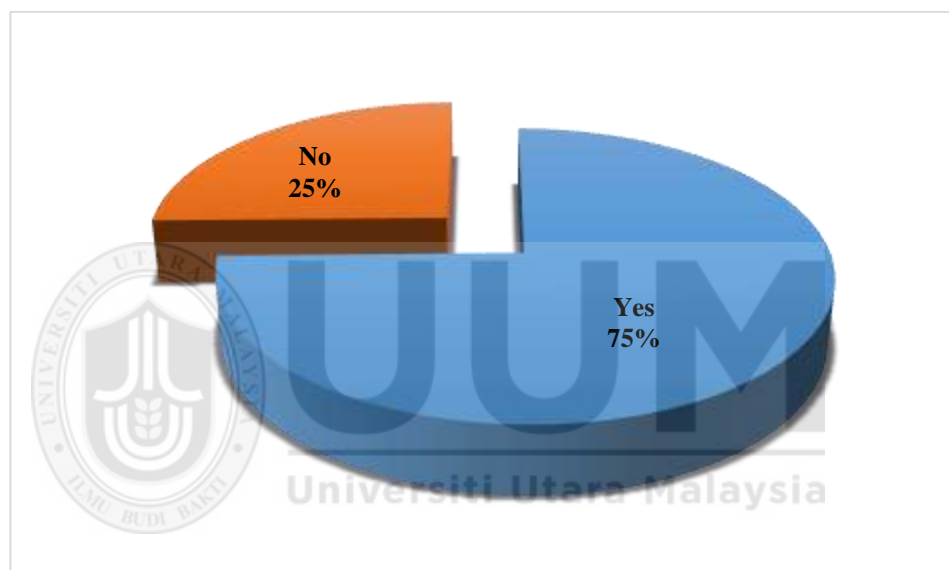


Figure 4.9: Typhoid Injection

4.6 Descriptive Statistics of Variables

A descriptive statistics were used in describing the basic features of data gathered (Trochim & Donnelly, 2001). It describes what the set of numbers looks like in terms of its central tendency and dispersion of data. However, since the sample size in the present study is considered large and normally distributed, the used of mean score usually provides a better measure of central tendency. The mean describes the average height, whereas a standard deviation tells how spread out the height is around that average.

The self-administered questionnaire survey was divided into five parts namely demographic information, food safety standard compliance, knowledge on food safety, attitudes towards food safety and food hygiene practices of food service operators in Kedah. The following subsection revealed descriptive statistics of variables obtained in the present study.

4.6.1 Mean and Range Analysis for Food Safety Standard Compliance

With reference to Table 4.9, described thirteen items with four dimensions measured for the dependent variable of the present study. The first dimension measured is process control, followed by food service operators' requirements, equipment and appliances, and sanitation facilities. Each mean values were different from each other. Respondents were asked to rate their responses from a Likert scale ranging from 1 to 5; where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree.

The highest mean value for food safety standard compliance level in Kedah shown in item number 8 with the mean value of 4.77, SD = 0.955. This clearly explained that food service operators in Kedah have agreed on serving food earlier than the actual serving time could increase the risk of food poisoning. Meanwhile, the lowest mean value shown in item number 4 (M = 3.74, SD = 0.858). Item number four mentioning the safe temperature for both hot and cold dishes. The response obtained revealed that the food service operators slightly agreed with the safe temperature for cooked food is $> 63^{\circ}\text{C}$ for hot dishes and $<-5^{\circ}\text{C}$ for frozen foods. The obtained result might be because they seldom monitor the temperature in handling these foods. In essence, all food service operators must be equipped with a thermometer to enabling them in

monitoring the temperature of prepared foods to ensure the foods were cooked thoroughly to minimize the risk of contamination. This is because solely depending on sense or colour changes do not guarantee that the handled foods are properly cooked. All foods must reach its minimum safe temperature to destroy all harmful bacteria that could cause foodborne illness.

Process control dimension was measured by items number 2, 4, 8, and 13. From the responses, item number 8 showing the highest mean value of 4.77, SD = 0.955, whereas the smallest mean value refers to item number 4 (M = 3.74, SD = 0.858). From the result, it was proven that food service operators slightly agreed with the safe food temperature for cooked and hot dishes is $>63^{\circ}\text{C}$ and $<-5^{\circ}\text{C}$ respectively. Items number 2 and 13 having a similar mean value of 4.31 and 4.32 correspondingly.

In reference to food service operators' requirements dimension, it was measured by items number 1, 3, 10 and 11 where the highest mean value refers to item number 10 (M = 4.37, SD = 0.764). The results exposed that the respondents moderately agree on their health condition when preparing food whereby they will not harm the food prepared despite their current health conditions upon handling foods. Item number 11 having the smallest mean value measuring the dimension with M = 4.17, SD = 0.794). The items mentioning that all kinds of jewellery should be avoided when handling foods.

The third dimension tested is equipment and appliance which were measured by items number 6, 7, and 9. These three items having a high mean value of 4.40, 4.45,

and 4.28 respectively. Indeed, by having appropriate equipment and appliances for both dry and wet raw materials helps in minimizing the risk of cross-contamination.

Finally, the last dimension tested in the questions is sanitation facilities which measured by item number 5 ($M = 4.02$, $SD = 0.750$). The mean value obtained is relatively high in ensuring pest control devices are working and in good condition. Pest repellents assist food service operators in deterring insects and prevent diseases pertaining to foods.

To conclude, the overall result obtained in explaining food safety standard compliance level in Kedah is at a satisfactory level. This result complements with the feedback received by the officers in charge during food premise inspection whereby all of the items were supplemented and scored from Food Act 1983 and Food Premise Grading system component checklist. (Please refer to Appendix C).

Table 4.9: Mean and Range Analysis for Food Safety Standard Compliance

No	Items	Range	Min	Max	Mean	SD
1	Food service operators are responsible for getting an anti-typhoid vaccine to control the spread of typhoid fever.	4	1	5	4.34	0.730
2	Knowing the temperature of the refrigerator is important to reduce the risk of food damage.	3	2	5	4.31	0.631
3	The use of hat, face mask, protective gloves and a proper clothing while handling food can reduce the risk of food poisoning.	3	2	5	4.32	0.792

4	The safe temperature for cooked food is > 63°C for hot dishes and <-5°C for frozen foods.	4	1	5	3.74	0.858
5	Pest control devices are working and in a good condition.	3	2	5	4.02	0.750
6	Wiping cloth is always in a clean state.	3	2	5	4.40	0.625
7	The environment and food storage equipment is in a clean condition.	3	2	5	4.45	0.644
8	Food preparation in advance before the actual serving time increases the risk of food poisoning.	4	1	5	4.77	0.955
9	Using a knife and different cutting boards when preparing wet and dry ingredients.	3	2	5	4.28	0.696
10	Food service operators should be free from any illness that can harmful to the food prepared.	4	1	5	4.37	0.764
11	The use of any kinds of jewellery should be avoided when preparing food.	4	1	5	4.17	0.794
12	Adequate amount of garbage bins provided and covered trash bins.	4	1	5	4.46	0.645
13	The purchases of raw materials that is displayed together with chemicals should be avoided.	4	1	5	4.32	0.798

4.6.2 Mean and Range Analysis for Food Safety Knowledge

Table 4.10 showed the result of food safety knowledge of food service operators towards microbial contamination, food storage, and food safety certification. As

indicated in the table, the mean value of all the items varies with the lowest value of 3.84, SD = 0.894, and the highest value of 4.45, SD = 0.638.

In regards to food service operators' knowledge in microbial contamination, the dimension were measured by items number 1, 2, 3, 4, 5, 6, 7 and 12. Based on these 8 items, all of them give a different mean values. The highest mean values for the dimension is shown in item number 4 with the mean score of 4.23, SD = 0.786. The respondents slightly agree on the occurrence of bacterial contamination because of the attitude of food service operators who neglected food safety while preparing foods. This is because, among all of the three traits in the KAP model, attitude plays the dominant role in food safety. Knowledge and practices influence one's attitude in making a wise judgment in everyday routine. Meanwhile, the lowest mean values identified by item number 1 (M = 3.84, SD = 0.894). The result showed that there is a relatively low level of knowledge in selecting raw materials to minimize the risk of bacterial contamination. The presence of microorganisms in raw materials could be fatal if the raw materials were not handled properly through the entire process of the food chain.

Moving on to the second dimension tested is food safety knowledge towards safe food storage. The dimension was analysed by item numbers 9, 10 and 11. Between these three items, the highest mean value can be seen in items number 11, followed with item number 10 with mean values of 4.37 and 4.30 respectively. Meanwhile, the lowest mean value was 4.18 which derived from item number 12. Amongst these three items, the participants least agreed on foods heated repeatedly could increase the risk of food contamination. In essence, foods that being heated repeatedly loosen

their nutrients and moisture that can cause illness at some point. Therefore, the best way to retain nutrients in foods is either through grilling or roasting technique. However, avoid reheating foods more than twice because the more times of reheating and cooling foods, the higher the risk of food poisoning. This is because the quality of foods decreases each time being reheated and thus enabling bacteria to multiply.

The last dimension tested was knowledge of food service operators towards food safety certification. The dimension was measured by item number 8. With the mean score of 4.32, SD = 0.666, food service operators agreed that certification does assist food service operators' in safe food consumption and beneficial to food business as well. The result is parallel with the result showed in Figure 4.8, where majority (51%) of participants felt the importance of food safety certification in the food business. This is because the goal of having food safety certification is to recognize food premises that have achieved good food safety practices and hygiene standards in serving healthy meals to consumers.

Hence, the overall food safety knowledge of food service operators in Kedah is moderately high. Food service operators must have basic knowledge in safe food practices to produce safe, balanced and healthy meals for human consumption.

Table 4.10: Mean and Range Analysis for Food Safety Knowledge

No	Items	Range	Min	Max	Mean	SD
1	Bacterial contamination occurred because of the wrong selection of raw materials.	4	1	5	3.84	0.894
2	Bacterial contamination occurred because of the improper ways of food storage.	4	1	5	4.17	0.730

3	Bacterial contamination occurred because of the improper ways of food preparation.	3	2	5	4.11	0.739
4	Bacterial contamination occurred because of the attitude of food service operators' who ignores food safety while preparing food.	4	1	5	4.23	0.786
5	Food contamination can occur at any stage of the food handling process.	3	2	5	4.06	0.716
6	Cross contamination is a major factor contributing to food poisoning. <i>*Cross contamination is a physical movement or the transfer of harmful bacteria from one person, an object or place to another.</i>	4	1	5	4.06	0.806
7	Typhoid disease (typhoid fever) is spread through foods and drinks that have been contaminated by faeces.	4	1	5	3.90	0.812
8	Certification in food safety assist food service operators to prepare and serve safe food to consumers.	4	1	5	4.32	0.666
9	Selection of fresh raw materials will leads to a healthy food that safe to be eaten.	3	2	5	4.45	0.638
10	Improper food storage can be harmful to consumers.	4	1	5	4.30	0.726
11	Cooked foods should be kept separately from raw materials.	3	2	5	4.37	0.713
12	Foods that were heated repeatedly increase the risk of food contamination.	3	2	5	4.18	0.840

4.6.3 Mean and Range Analysis for Attitude on Food Safety

For the fourth section of the questionnaire survey, respondents were asked to select their responses from a Likers scale of 1 to 5; where 1 = strongly disagree, 2 =

disagree, 3 = neutral, 4 = agree and 5 = strongly agree for three dimensions – food hygiene and sanitation, self-improvement and food safety concern.

The first dimension tested is food hygiene and sanitation which were measured by items number 4, 6, 7, and 8. Referring to Table 4.11, majority of the food service operators agreed that cooking food thoroughly is an effective way to ensure food safety ($M = 4.41$, $SD = 0.732$). However, food service operators slightly agreed with food safety is more important over the taste of food. Finally, majority of the respondents agreed that they should have always chop the raw materials into smaller sizes in regards to speed up the cooking process.

The second dimension discussed on self-improvement measured by item number 3. With the mean score of 4.17, majority of the food service operators agreed more information regarding food safety practices can be obtained through an effective reading in improving their knowledge and skills in handling foods thus assists in serving healthy meals.

Last but not least, the food service operators' attitudes on food safety concerns were explored by measuring items number 1, 2, 5, 9, 10, 11 and 12. Based on the self-administered questionnaire survey, the response revealed that food service operators moderately agree in selecting an unopened processed foods packaging as part of food safety practices; item number 9 ($M = 3.59$, $SD = 1.132$). The situation explained that food service operators' actions in selecting undamaged packaging as a sign on providing extra protection in maintaining the freshness of cooked foods. In addition to this, with the average mean range between 2.22 and 2.78, food service operators

slightly agree on cleanliness aspect of food safety concerns. For instance, often ignored self-appearance during working hours, wearing jewellery while handling foods, always thawed frozen foods repeatedly, and stacking the leftovers in the refrigerators close to one another to make space in the refrigerator.

Besides that, most relieved response obtained in item number 5 was the fact that the food service operators will not continue preparing foods even though in an unhealthy condition ($M = 2.30$, $SD = 1.167$) and always use the same towel to clean the counters and also cooking utensils – item number 6 ($M = 2.22$, $SD = 1.206$). Sick food service operators should not be working because they can spread the disease to foods and might also affect both customers and workers. Foods prepared by unwell food service operators might have been contaminated by *Staphylococcus aureus* bacteria which were a presence in the nasal passages, mouth or throat of an unwell person. The bacteria can be spread through contact with foods, sneezing or coughing during the entire process of food preparation. Therefore, sick food service operators who are not capable of working should only stay at home and must not handle any food to prevent unwanted virus transmission through improper food handling or poor sanitation practices.

Apart from that, having the same towels in cleaning both the counters and cooking utensils is an inappropriate practice because bacteria can also be spread through towels. A high number of bacteria that were present on the towels were believed can easily become contaminated at significant levels thus carrying pathogen microorganisms that potentially lead to foodborne illnesses as indicated by

Matthewson and Heacock, (2017). In general, food service operators in Kedah have performed a moderate attitude in food safety.

Table 4.11: Mean and Range Analysis for Attitude on Food Safety

No	Items	Range	Min	Max	Mean	SD
1	I think cooking food thoroughly ensures food safety.	4	1	5	4.41	0.732
2	I think food safety is always more important than taste.	3	2	5	4.10	0.803
3	I will read more information on food safety to improve my food safety knowledge.	2	3	5	4.17	0.665
4	I think that it is okay to touch exposed food with bare hands.	4	1	5	2.46	1.231
5	I will keep on preparing food even though I am in an unhealthy condition.	4	1	5	2.30	1.167
6	I always use the same wiping towel to clean the counters and also cooking utensils.	4	1	5	2.22	1.206
7	I think wearing jewellery when preparing food is not an issue.	4	1	5	2.38	1.206
8	I often ignore my self-appearance during my working time.	4	1	5	2.22	1.269
9	I will choose the processed foods in unopened packaging.	4	1	5	3.59	1.132
10	I always thawed frozen foods repeatedly.	4	1	5	2.56	1.157
11	I always store the leftovers in the refrigerator very close to one another to make space.	4	1	5	2.78	1.182
12	I always cut the raw materials to the appropriate size to speed up the cooking process.	4	1	5	3.75	0.854

4.6.4 Mean and Range Analysis for Hygiene Practices

By referring to Table 4.12, the mean analysis for food service operators' hygiene practices on food safety was exposed. Accordingly, all eight items fall under the process control dimension. Each of these items having different mean values except for items number 2 and 3 which shares the same mean value of 4.32. As illustrated in the below table, item number eight showed the highest mean value of 4.50. Trash bin containers should be closed at all times because pests were attracted to waste. One of the means of maintaining safe food consumption is keeping the trash lid closed all the time.

In contrast, item number 6 having the smallest mean value of 2.45. Apparently, the respondents were least agree with the statement of storing leftovers for more than five days. This is such a good indication of hygiene practice because having leftovers for more than five days could pose a risk of food poisoning unless the foods were frozen completely. In conclusion, food service operators in Kedah performed a moderate hygiene practices when handling foods.

Table 4.12: Mean and Range Analysis for Hygiene Practices

No	Items	Range	Min	Max	Mean	SD
1	During the food preparation process, I always choose fresh raw ingredients.	4	1	5	4.48	0.620
2	I will use the expiry date as a guide to determine the safety of the food.	4	1	5	4.31	0.800
3	I am responsible for separating raw foods and cooked foods in different spaces.	3	2	5	4.32	0.697

4	I will ensure that raw materials such as meat and fish kept in a freezer as soon as possible after cleaning to prevent damage.	2	3	5	4.43	0.596
5	I always leave frozen food (frozen) thawed at room temperature before using them.	4	1	5	3.92	0.867
6	I stored leftovers in the refrigerator for more than five (5) days.	4	1	5	2.45	1.251
7	I always store all perishable foods in the refrigerator after my shift ends.	4	1	5	3.45	1.271
8	I will keep the trash cans closed at all time.	3	2	5	4.50	0.599

In accordance with Table 4.13, the overall results for mean percentage scores for knowledge, attitude, and practices (KAP) of the sample size were summarized. The highest mean values obtained for the dependent variable of the present study refers to the food safety standard compliance level in Kedah. Overall, both male and female respondents assumed to comply with food safety standards. However, both male and female respondents having a relatively low attitude level on food safety with the mean value of 3.13 and 3.05 respectively. The results clearly disclosed that the food service operators in Kedah having a fairly poor attitude while handling foods.

Hence, by referring to Table 4.13, all of the variables having moderately high mean values except for food service operators' attitude towards food safety practices showing the lowest mean values compared to the other variables.

Table 4.13: Mean Percentage Score for Food Safety Standard Compliance, Knowledge, Attitude, and Practices According to Gender of Food Service Operators in Kedah. ($n=241$)

Variables	Gender	<i>n</i>	Mean	SD
Food Safety Standard Compliance	Male	83	4.25	0.45
	Female	158	4.21	0.43
Knowledge	Male	83	4.18	0.48
	Female	158	4.16	0.45
Attitude	Male	83	3.13	0.73
	Female	158	3.05	0.59
Practice	Male	83	4.04	0.52
	Female	158	3.95	0.45

4.7 Goodness of Measures

Since all of the instruments pertaining to the research questions were adapted from the previous scholars, the accuracy, efficiency and usability of those measurements towards food safety studies required to be evaluated and confirmed. Thus, validity and reliability test was conducted through factor analysis for all of the items in the present study.

4.7.1 Construct Validity

Construct validity refers to the adequacy of an operational definition of a variable that was believed to match the actual measurement (Brown, 2000). Since majority of the adapted items in the questionnaire survey were tested in the perspective of western countries settings, therefore the items need to be validated to fit the context of the local study setting. Hence, an exploratory factor analysis (EFA) was performed in measuring all of the constructs in the present study.

4.7.2 Exploratory Factor Analysis (EFA)

Exploratory factor analysis or EFA for short is a method used in structuring the relationships between variables (Bandalos, 1996). It is a technique that transformed the correlations among a set of observed variables into a smaller number of underlying factors that contain all the essential information and thus confirmed the measurement theory (Yong & Pearce, 2013).

In conducting an EFA, sample size, normality test, outliers, number of variables and linearity assumptions should firstly meet (Yong & Pearce, 2013). Most of the published sample size recommendations were simplified in absolute numbers. For instance, Gorsuch (1983) and Kline (1994) suggested sampling is at least 100 subjects. On the other hand, De Winter, Dodou, and Wieringa (2009) agreed that 50 sample size as a reasonable absolute minimum value. However Cattell (1978) proposed that 500 would be a good sample size, but 200 could be acceptable. Therefore, based on the arguments, there was no violation of sample size assumptions since the usable sample size for the present study were 241.

Besides that, by considering the data gathered was normally distributed and no extreme outliers detected, hence there was also no violation of the data normality and outliers assumption. The last criterion needed to achieve before conducting an EFA is a number of variables used in the present study. In conducting an EFA, the used variables should at least three variables with high loadings (Ferguson & Cox, 1993). The present study comprises four variables, hence met the variable assumption of EFA.

Linearity assumes that the correlations between variables are linear. So to test this assumption, an analysis was performed to examine the bivariate correlation for each pair of variables to make sure that there are no signs of non-linear correlation. Table 4.14 and Table 4.15 revealed the linearity and correlation test of the present study.

Table 4.14: Linearity Test

Variable	Significant Value	Result
Knowledge with Food Safety Standard Compliance	0.000	Linear
Attitude with Food Safety Standard Compliance	0.552	Non-Linear
Practice with Food Safety Standard Compliance	0.000	Linear

Table 4.15: Correlation Test

		Knowledge	Attitude	Practice	Food Safety Standard Compliance
Knowledge	Pearson Correlation	1	.149*	.456**	.696**
	Sig. (2-tailed)		.021	.000	.000
	N	241	241	241	241
Attitude	Pearson Correlation	.149*	1	.379**	.039
	Sig. (2-tailed)	.021		.000	.552
	N	241	241	241	241
Practice	Pearson Correlation	.456**	.379**	1	.440**
	Sig. (2-tailed)	.000	.000		.000
	N	241	241	241	241
Food Safety Standard Compliance	Pearson Correlation	.696**	.039	.440**	1
	Sig. (2-tailed)	.000	.552	.000	
	N	241	241	241	241

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

In this output, both significant and non-significant correlation was observed. A significant correlation indicates the linearity, which meets the linear assumption. However, the researcher is concerned with the non-significant correlations. Non-linearity is a serious violation of the linearity assumption. Basically in these cases, the linearity is apparent.

In order to detect a non-linearity, a scatter plot will be used to assist in identifying the pattern of the data. A straight line pattern shows linearity. If the plot shows a random pattern, it indicates no correlation at all and thus data transformation may be needed. This is considered acceptable for the linearity assumption.

For example, a straight-line pattern can be seen in Appendix G which indicates the linear correlation, or linearity, between these two variables – knowledge and practice with food safety standard compliance. There is a sign of clear linearity patterns in these graphs. Whereas in other cases, a random pattern can be observed indicating a non-significant correlation between variables.

As discussed before, this is not a major concern regarding the linearity assumption. The major concern is with any non-linearity patterns such as parabolic or exponential curves. In this case, there is no sign of such patterns. Therefore, the linearity assumption can be concluded.

Based on the results gained through linearity (Table 4.14) and correlation table (Table 4.15), the researcher concluded that a significant difference does exist between the two variables; knowledge and practice which were highly significant

with food safety standard compliance. Both test showed that the relationship between knowledge and practice with food safety standard compliance are statistically significant, $r = 0.696$, $p = <0.001$ and $r = 0.440$, $p = <0.001$ respectively. On the other hand, the attitude has not had linearity with food safety standard compliance with a significant value of 0.552, which is greater than 0.05.

4.8 Reliability Analysis

In accordance to Taber (2018), reliability analysis was carried out with the means to check the internal consistency of a particular questionnaire or a scale. It was done in order to determine whether the questionnaire measures the construct which it was designed to measure. The consistency of each item will be determined by Cronbach's alpha value, which is crucial for the researcher to add validity and accuracy to the data interpretation. Cronbach's alpha is a coefficient and it is expressed as a number between 0 and 1. Technically, if the items are highly correlated to each other, the alpha value will be closer to 1, in which they are highly reliable scale (Tavakol & Dennick, 2011).

Higher values of Cronbach's alpha values are more desirable. However, there were different arguments on the acceptable values of alpha values, ranging from 0.60 to 0.95 (Tavakol & Dennick, 2011; Bland & Altman, 1997). Nunnally (1978) has indicated the Cronbach's alpha value of 0.70 or greater to be an acceptable and strong reliability coefficient. Meanwhile, Hair et al. (2010) suggested there was the presence of items redundancies for Cronbach's alpha value of more than 0.90 and thus suggested the test length should be shortened. Somehow, Hinton, McMurray, and Brownlow (2014), mentioned that 0.60 as the lowest acceptable Cronbach's

alpha value before the items can be used as an instrument. However, Cronbach's alpha value of less than 0.50 is usually moderately reliable. The following Table 4.16 illustrated the result of reliability analysis for each factor in the present study.

Table 4.16: Statistical Summary of Reliability Analysis

Variable	No. of Items	Mean	SD	Cronbach Alpha
Food Safety Standard Compliance	13	4.226	5.675	0.837
Knowledge	12	4.165	5.472	0.839
Attitude	12	3.075	7.728	0.839
Practice	8	3.983	3.796	0.655

In accordance with the above Table 4.16, all the three variables namely food safety standard compliance, knowledge and attitude considered as having an excellent Cronbach's alpha score of 0.837, 0.839 and 0.839 respectively and thus support the arguments for internal consistency. The construct of practice, however, meets the acceptable minimum value of validity with 0.655 Cronbach's alpha score as suggested by Hinton, McMurray, and Brownlow (2014). Therefore, based on the results provided above, all of the construct measurement exceeds reliability and internal consistency for the present study.

4.9 Correlation Analysis

This section presents the results of correlation analysis of the present study. Correlation analysis is a popular way of representing the strength of the connection between pairs of variables (Sekaran & Bougie, 2016). The information allows the researcher to conclude about the existence of a strong relationship between two sets of variables. Therefore, a Pearson Correlation test was implied in the present study to verify the hypotheses and thus achieve the research objective.

In statistics, the Pearson's correlation coefficient (r) is always between negative 1 and 1. By referring to Benesty, Chen, Huang, and Cohen (2009), if $(r) = 0$, then the two variables are said to be uncorrelated. The closer the value of (r) is to 1, the stronger the correlation between the pair of variables. A perfect positive linear relationship occurred when the result of (r) is equal to 1 whereas a perfectly negative relationship is when (r) is negative 1. According to Cohen (1998), the range and strength of (r) can be distinguished as shown in below Table 4.17:

Table 4.17: Pearson's Correlation Coefficient (r) Indicator

Coefficient, (r)	Indicator
$(r) = 0.10$ to 0.29 or $(r) = -0.10$ to -0.29	Low
$(r) = 0.30$ to 0.49 or $(r) = -0.30$ to -0.49	Moderate
$(r) = 0.50$ to 1.00 or $(r) = -0.50$ to -1.00	High

Therefore, the correlation analysis is utilized in the present study to clarify the relationship between the independent variables (knowledge, attitude, and practices) and dependent variable (food safety standard compliance) and thus able to measures food safety standard compliance level in Kedah. Hypothesis 1 was analysed and presented in Table 4.18 as follows.

Hypothesis 1: There is a significant relationship between food service operators' knowledge and food safety standard compliance.

The above hypothesis indicated that food service operators' knowledge has a positive relationship with food safety standard compliance. The relationship between these pairs of variables was tested by utilizing (r) . By referring to the presented Table 4.18, there is a significant correlation between food service operators' knowledge and food

safety standard compliance. There is a very strong positive correlation which (r) = 0.696 and $p = <0.001$. Therefore, this hypothesis is supported.

Table 4.18: Correlation of Knowledge and Food Safety Standard Compliance

Food Safety Standard Compliance		
Knowledge	Pearson Correlation (r)	0.696**
	Sig. (2-Tailed)	0.000
	N	241

** Correlation is significant at the 0.01 level (2-tailed).

Hypothesis 2: There is a significant relationship between food service operators' attitude and food safety standard compliance.

The following Table 4.19 indicates the relationship between food service operators' attitude and food safety standard compliance. The relationship between these two variables displayed a positive value and has a relatively low relationship with (r) = 0.039. Even though the correlation is relatively low, the p -value is usually significant depending upon the sample size. In this analysis, the p -value is > 0.05 , thus there is a moderate positive correlation between these pair of variables. Therefore, this hypothesis is supported.

Table 4.19: Correlation of Attitude and Food Safety Standard Compliance

Food Safety Standard Compliance		
Attitude	Pearson Correlation (r)	0.039
	Sig. (2-Tailed)	0.552
	N	241

Hypothesis 3: There is a significant relationship between food service operators' hygiene practices and food safety standard compliance.

In accordance with the following Table 4.20, the result revealed that there was a moderate relationship between these two pairs of variables with $(r) = 0.440$, where $p\text{-value} = <0.001$. Based on the result, there was a significant moderate relationship between food service operators' hygiene practices and food safety standard compliance. Therefore, the third hypothesis of the present study was supported.

Table 4.20: Correlation of Practice and Food Safety Standard Compliance

Food Safety Standard Compliance		
Practice	Pearson Correlation (r)	0.440**
	Sig. (2-Tailed)	0.000
	N	241

** Correlation is significant at the 0.01 level (2-tailed)

4.9.1 Correlation Hypotheses Testing Summary

Based on the analysis of the presented data, the summary of the present study's finding is shown in Table 4.21.

Table 4.21: Summary of Hypotheses Testing

No	Hypotheses	Findings
H ₁	There is a significant relationship between food service operators' knowledge food safety standard compliance.	Supported
H ₂	There is a significant relationship between food service operators' attitude and food safety standard compliance.	Supported
H ₃	There is a significant relationship between food service operators' hygiene practices and food safety standard compliance.	Supported

4.10 Regression Analysis

The present study performed a regression analysis to predict which variables, in particular, are significant predictors of the outcome variable, and in what way does the variable indicated. The model summary of regression analysis was presented in the subsection below.

4.10.1 Regression Analysis – Knowledge and Food Safety Standard Compliance

The model summary in Table 4.22 shows the correlation coefficient and correlation determination of food service operators' knowledge and food safety standard compliance. The correlation coefficient is 0.485 and the correlation determination is 0.483. On the other hand, ANOVA in Table 4.23 shows the *p-value* of the relationship <0.001 and how much of the variation of the dependent variable is explained by the independent variable. From the table, the result showed that 22.18 out of 45.74 total variances is explained by the dependent variable. Finally, the coefficient results displayed in Table 4.24 shows the equation of the regression line, the slope of the line (1.449), the intercept at the y-axis and the *p-value* of the relationship between food service operators' knowledge and food safety standard compliance.

Table 4.22: The Model Summary of Regression Analysis: Knowledge and Food Safety Standard Compliance

R	R Square	Adjusted R Square	Std. Error of the Estimate
.696 ^a	.485	.483	.31398

a. Predictors: (Constant), Knowledge

b. Dependent Variable: Food Safety Standard Compliance

Table 4.23: ANOVA of Knowledge and Food Safety Standard Compliance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	22.178	1	22.178	224.962	.000 ^b
Residual	23.562	239	.099		
Total	45.740	240			

a. Dependent Variable: Food Safety Standard Compliance

b. Predictors: (Constant), Knowledge

Table 4.24: Coefficient of Knowledge and Food Safety Standard Compliance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	1.449	.186		7.781	.000	1.082	1.816
Knowledge	.667	.044	.696	14.999	.000	.579	.754

a. Dependent Variable: Food Safety Standard Compliance

The correlation coefficient 0.696 which is similar in Pearson correlation and the correlation determination is 0.485. This means that 48.5% of food safety standard compliance is explained by food safety knowledge of food service operators. The slope of the regression line is 0.667 with the y-axis intercept at 1.449. The *p-value* = <0.05, reject the null hypothesis. Therefore, there is a significant linear relationship between knowledge and food safety standard compliance. Knowledge is a significant predictor factor for compliance.

4.10.2 Regression Analysis – Attitude and Food Safety Standard Compliance

The model summary in Table 4.25 shows the correlation coefficient and correlation determination between food service operators' attitudes and food safety standard compliance. The correlation coefficient is 0.001 and the correlation determination is

-0.03. On the other hand, ANOVA in Table 4.26 shows the *p-value* of the relationship 0.552 and how much of the variation of the dependent variable is explained by the independent variable. From the table, 0.068 out of 45.74 total variances are explained by the dependent variable. Finally, the coefficient results displayed in Table 4.27 shows the equation of the regression line, the slope of the line (4.146), the intercept at the y-axis and the *p-value* of the relationship between food service operators' attitude and food safety standard compliance.

Table 4.25: The Model Summary of Regression Analysis: Attitude and Food Safety Standard Compliance

R	R Square	Adjusted R Square	Std. Error of the Estimate
.039 ^a	.001	-.003	.43715

a. Predictors: (Constant), Attitude

b. Dependent Variable: Food Safety Standard Compliance

Table 4.26: ANOVA of Attitude and Food Safety Standard Compliance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.068	1	.068	.355	.552 ^b
Residual	45.672	239	.191		
Total	45.740	240			

a. Dependent Variable: Food Safety Standard Compliance

b. Predictors: (Constant), Attitude

Table 4.27: Coefficient of Attitude and Food Safety Standard Compliance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	4.146	.138		30.116	.000	3.874	4.417
Attitude	.026	.044	.039	.596	.552	-.060	.112

a. Dependent Variable: Food Safety Standard Compliance

The correlation coefficient 0.039 which is similar in Pearson correlation and the correlation determination is 0.001. This means that 0.10% of food safety standard compliance is explained by the food handling attitude of food service operators. The slope of the regression line is 0.026 with the y-axis intercept at 4.146. The *p-value* = >0.05, accept the null hypothesis. Therefore, there is no significant linear relationship between the attitude of food service operators and food safety standard compliance. Attitude is not a significant predictor factor for food safety standard compliance.

4.10.3 Regression Analysis – Hygiene Practices and Food Safety Standard Compliance

The model summary in Table 4.28 shows the correlation coefficient and correlation determination food service operators' hygiene practices and food safety standard compliance. The correlation coefficient is 0.194 and the correlation determination is 0.191. On the other hand, ANOVA in Table 4.29 shows the *p-value* of the relationship <0.001 and how much of the variation of the dependent variable is explained by the independent variable. From the table, the result showed that 0.870 out of 45.74 total variances is explained by the dependent variable. Finally, the coefficient results displayed in Table 4.30 shows the equation of the regression line, the slope of the line (2.612), the intercept at the y-axis and the *p-value* of the relationship between food service operators' hygiene practices and food safety standard compliance.

Table 4.28: The Model Summary of Regression Analysis: Hygiene Practices and Food Safety Standard Compliance

R	R Square	Adjusted R Square	Std. Error of the Estimate
.440 ^a	.194	.191	.39277

a. Predictors: (Constant), Hygiene Practices

b. Dependent Variable: Food Safety Standard Compliance

Table 4.29: ANOVA of Hygiene Practices and Food Safety Standard Compliance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	8.870	1	8.870	57.499	.000 ^b
Residual	36.870	239	.154		
Total	45.740	240			

a. Dependent Variable: Food Safety Standard Compliance

b. Predictors: (Constant), Hygiene Practices

Table 4.30: Coefficient of Hygiene Practices and Food Safety Standard Compliance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	2.612	.214		12.190	.000	2.190	3.034
Hygiene Practices	.405	.053	.440	7.583	.000	.300	.510

a. Dependent Variable: Food Safety Standard Compliance

The correlation coefficient 0.440 which is similar in Pearson correlation and the correlation determination is 0.194. This means that 19.4 % of food safety standard compliance is explained by the hygiene practices of food service operators. The slope of the regression line is 0.405 with the y-axis intercept at 2.612. The *p-value* = <0.05, reject the null hypothesis. Therefore, there is a significant linear relationship between

hygiene practices and food safety standard compliance. Hygiene practices is a significant predictor factor for food safety standard compliance.

4.10.4 Regression Hypotheses Testing Summary

Based on the analysis of the presented data, the summary of regression hypotheses testing is presented in Table 4.31.

Table 4.31: The Relationship between Knowledge, Attitude and Hygiene Practices and Food Safety Standard Compliance

	<i>b</i> (95% CI)	<i>t</i> statistic	<i>p</i> value*	<i>r</i> ²	Result
Knowledge	0.667 (0.579, 0.754)	14.999	< 0.001	0.485	Significant
Attitude	0.026 (-0.060, 0.112)	0.596	0.552	0.001	Not significant
Hygiene Practices	0.405 (0.300, 0.510)	7.583	< 0.001	0.194	Significant

*Simple linear regression

4.11 Summary of Reporting Quantitative Phase

The researcher performed quantitative analysis to confirm and complements the findings from the qualitative phase. Based on the quantitative result analysis, it is affirmed that there is a significant relationship between food service operators and food safety standard compliance. Thus, supports the findings from the qualitative results. The summary of the quantitative finding is shown in Table 4.32.

Table 4.32: Summary of Quantitative Phase

Analysis	Variables	Findings
Mean Analysis	Food Safety Standard Compliance	Satisfactory
	Food Safety Knowledge	Moderately High
	Attitude on Food Safety	Fairly Poor
	Hygiene Practices	Moderate
Linearity Test	Knowledge with Food Safety Standard Compliance	Linear
	Attitude with Food Safety Standard Compliance	Non-Linear
	Practice with Food Safety Standard Compliance	Linear
Hypotheses Testing	<p><i>Hypothesis 1:</i> There is a significant relationship between food service operators' knowledge and food safety standard compliance.</p>	Supported
	<p><i>Hypothesis 2:</i> There is a significant relationship between food service operators' attitude and food safety standard compliance.</p>	Supported
	<p><i>Hypothesis 3:</i> There is a significant relationship between food service operators' hygiene practices and food safety standard compliance.</p>	Supported
Regression Analysis	The Relationship between Knowledge and Food Safety Standard Compliance	Significant
	The Relationship between Attitude and Food Safety Standard Compliance	Not significant
	The Relationship between Hygiene Practices and Food Safety Standard Compliance	Significant

4.12 Chapter Summary

Since the qualitative research in the present study was derived from natural interaction between the respondents, therefore it revealed interesting results that could be beneficial in future research. Besides, by practicing both qualitative and quantitative approaches, the results showed consistency as both methods support one another. Meanwhile, the case study approach assists the researcher in finding the true incidence of food poisoning cases in Kedah by using the content analysis method, whereas SPSS software benefits the research in processing critical data for the questionnaire survey. Thus, generate a better understanding which complements the case study. The detailed discussions of the findings will be further explained in the next chapter.



CHAPTER FIVE

CONCLUSION

5.1 Introduction

This chapter discussed the analytical results that were revealed in previous chapter four. The contribution of the present study both theoretically and practically was also highlighted, followed by research limitations, offers recommendations for future research and lastly concludes the overall findings of the present study.

5.2 Recapitulation of the Study

The general purpose of conducting the present study is to have a better understanding of the root cause of food poisoning cases in Kedah by accessing the food service operators' through the KAP model. The justification of choosing a single case study approach because of its' uniqueness and complex cases as according to Yin (2003) which also parallel to the food poisoning outbreak that has taken place in Kedah in the year 2013. It was such a unique and complex case that had caused a fatal tragedy that claimed the lives of innocent guests who attended the wedding feast.

Therefore, in order to have a better understanding of this fatal issue, the researcher initially conducted the present study qualitatively. An interview approach is one of the common methods of data collection technique in qualitative studies since this method could give an in-depth understanding of the phenomenon being investigated. The interviewees include the food safety officers from the Food Safety and Quality Division, Ministry of Health Malaysia. Both respondents were the authorities who handled this case. Besides that, the researcher was also hoped to approach the food handlers who cook for the wedding banquet as well as the family of the deceased as

respondents pertaining to the case study. However, the cook and the family of the deceased refused to be interviewed as the tragedy was too personal to be talked about even though it has been several years since the tragedy happened.

Consequently, the researcher proceeds with the second method quantitatively in order to confirm and complement the findings from the previous interviews by the Kedah food safety authorities. The reason for collecting both qualitative and quantitative data is to bring the strengths of both research methods to evaluate the results as recommended by Yin (1994). Hence, a questionnaire survey approach was distributed to randomly selected food service operators in Kedah's district which includes Kulim, Sungai Petani, Gurun, Yan, Alor Setar, Jitra, Kubang Pasu, Changlun, and Sintok. Food service operators were selected as the main respondents in the present study because they act as main actors in food handling and preparation. They were the major players in ensuring whether or not the food produced safe for human consumption.

Meanwhile, the KAP model was designated as a measurement of data collection in the present study because the components tested were able to confirm or disproved a hypothesis and thus measures the actual performance on the selected respondents. Besides that, the KAP model also acts as a reference baseline in measuring the effectiveness of any programs enforced. It has the inter-relationship between ones' knowledge and practices which may have resulted in changes of attitude, or vice versa. Therefore, the characteristics of the KAP model best suits the research requirements in the present study.

5.3 Summary of Results

The main interest of conducting the present study was to identify which of these three traits (knowledge, attitude, and practices) triggers the occurrence of food poisoning episodes in Kedah and finally able to determine the food safety standard compliance of food service operators in Kedah. Besides that, the present study was carried out to allow the researcher to have a better understanding of the never-ending food poisoning episodes. The results of the present study revealed the level of food safety standard compliance was much dependent on the level of knowledge on food safety, attitude towards food safety and food hygiene practices among food service operators at the premise.

5.3.1 Food Safety Standard Compliance

The finding of the present study exposed that the overall food safety standard compliance level in Kedah is at a satisfactory level. The conclusion was made based on the result from the qualitative semi-structured interview with a food technologist from Kedah's Food Safety and Quality Division and complementary data from quantitative result analysis and interpretation in Table 4.9.

In a conclusion, the combination of these three factors; the level of food safety knowledge, attitude towards food safety and food hygiene practices among food service operators play a dominant role in determining the current food safety standard compliance level in Kedah. Therefore, in order to meet a good food safety standard compliance, food premises owners' must regularly access and improve food service operators' knowledge, attitude in handling foods as well as hygiene practices to prevent pathogen growth that may lead to foodborne outbreaks. Besides that, the

respective authority such as health officers, must also conduct a regular food premise inspections routine to ensure both owners and food service operators meets the minimum requirement in maintaining food premises clean and free from food-related illness risk.

5.3.2 Food Safety Knowledge

From the data presented in Table 4.10, the researcher found that majority of the randomly selected respondents were knowledgeable prior to hygiene practices, cleaning, and sanitation. They have a basic knowledge concerning food safety in terms of microbial contamination, food storage and the importance of food safety certification for food business purposes.

The awareness of the importance of food safety knowledge shown by the respondents in this study is appropriate. In a conclusion, food service operators in Kedah having moderately high level of knowledge in food safety but this result does not guarantee to be translated into good hygienic practices during processing and handling food products at the premises. The result was in line with a study done by Akabana, Hlortsi, and Owusu-Kwarteng (2017) who suggested that lack of food safety knowledge may lead to poor attitude and hygiene practices of food service operators. Besides that, this statement was also supported by the interview results. The respondents claimed that having good knowledge does not ensure good practice in a real-time situation.

5.3.3 Attitude on Food Safety

Based on the semi-structured interview with one of the food technologists from the Kedah Food Safety and Quality Division, the respondent claimed that the attitude of food service operators in handling foods was proven to be the major cause of foodborne related illness. The respondent further explained, food poisoning occurred as a result of consuming food contaminated with microorganisms whereby this contamination due to inadequate preservation methods, improper food storage, and time and temperature abuse. The risk of consuming contaminated food could be reduced to the lowest possible if all food service operators practice favourable attitude in handling foods regardless of the stressful condition in the kitchen.

The respondent added, there were also food poisoning cases that have been attributed to infected food service operators who involved in catering services. This situation normally took place in a large scale cooking, in which food is handled by many individuals and increase the chances of food contamination due to improper handling – which it also refers to the attitude of food service operators. Accidental contamination caused by human errors in large scale production might endanger the health of consumers and have a very expensive consequence to human's life. The respondent further explained, it is an undeniable fact that having many cooks does lighten the burden of cooking in a large quantity and less time consuming. However, each food service operators much ensure that they have responsibilities to produce not only a delicate dishes but most importantly the safety of foods produced. Therefore, attitude in handling food is the most crucial factor in combating food-related issues. Finally, based on the results published qualitative and quantitatively,

the researcher concluded that food service operators in Kedah performed fairly poor attitude during food handling and preparation processes.

5.3.4 Hygiene Practices of Food Service Operators

Based on the qualitative content analysis, the respondent claimed that food service operators often neglected hygiene practices in food preparation upon inspections. It was frequently practiced by foreign food service operators who run food premises in Kedah. For instance, keeping long nails, not wearing an apron and even worst, the raw materials were placed directly on the dirty floor, besides kitchen appliances being washed in muddy water and the premise has no proper irrigation system. All of these activities were behind the kitchen walls that the consumers were not aware of. Most of them were not local, thus their understanding of hygiene practices was not as hygienic as practiced by Malaysians food service operators. Despite that, local food service operators have a higher hygiene awareness compared to foreigners.

However, the data gathered from the quantitative questionnaire survey revealed that food service operators in Kedah having a moderate hygiene practices. This result is significant with the statement claimed by the qualitative respondent who emphasized that local food service operators having a moderate level of food hygiene practices. This is because majority of the quantitative respondents were the locals.

5.4 Discussion on Research Findings

The following sub-section reports on the findings and discussions of the present study which were derived from both qualitative and supplemented by quantitative data as presented in Chapter 4.

5.4.1 Research Question 1: What has been the consequences of food poisoning incidence to the food business?

The Government of Malaysia has designated all food service operators who involved directly or indirectly in food business and services were to strictly follow the guidelines that have been established in Food Act 1983 and Food Hygiene Regulations 2009.

Prior to the heart-breaking tragedy, several initiatives have been implemented by the Ministry of Health Malaysia including thorough food premise inspections such as enforcement in food handling training courses, premise license, typhoid injection, and premise closure. All of these agendas will be executed by the respective District Health Officer.

According to the semi-structured interview analysis, both the respondents mentioned that food premises' inspections were held periodically in order to maintain the food premises' standard is always at a satisfactory level and thus minimize the chances of food contamination at risks area. The inspections will be enforced by the respective District Health Officer. Food premises that do not meet the food safety standards accordingly with the Food Act 1983 and Food Hygiene Regulations 2009 were eligible to be compound prior to the offenses made during the inspections.

The respondents added, amongst the frequent offenses made by the food premises' owner as well as food service operators during the inspection was the failure to provide a food handler training certificate upon requested. Food handling courses are compulsory to be attended by all food service operators once in a lifetime, and they

were required to repeat the course if they were found not practicing good food handling techniques as taught in the courses. In return, a food handler certificate will be awarded to food service operators who attended and completed the 3-hour courses conducted by Certified Food Handlers Training School. The main objective of the food handling course is generally to provide exposure and awareness on the importance of providing clean and safe food to all food service operators in the food and services industry.

The respondents further elaborates, by referring to Food Act 1983, food service operators include the person who a) directly involved in the provision of food, b) touching food or surface touching food, and c) controlling packaged or non-wrapped food or appliances. This means that everyone involved in the food industry such as chefs, cooks, food suppliers, lorry drivers who deal with food transportation, food service operators, and supervisors must comply with the said regulations and mandatory to attend the course. According to Regulation 30 of Food Hygiene Regulations 2009, the failure of any food service operators to undergo food handling courses and obtaining a certificate from a certified institution can be convicted of a fine of not more than RM 10,000 or 2 years of imprisonment.

Based on the quantitative data in subsection 4.5.6, there were merely little differences in the frequency of respondents' participation in the food handling training course. The result showed that only 130 respondents have had their training whereas the remaining 111 respondents have not attended any of the training throughout their involvement in the food preparation sector. The result complemented the interview analysis from the first respondent who mentioned that

majority of the food service operators in Kedah, have never been in a formal food safety training due to high turnover rate. He further explained that it was the responsibility of the food premises' owners to send food service operators for food handling training courses. However, due to high rate of employee turnover, the owner feels the burden to always send new-hired employees for the course which cost RM 50 per person and took approximately 3 hours of their working time, which in turn would generate more income to the premise within the 3 hours' time. Besides, the owner thought that the new-hired employees will be able to learn on food handling through on-job training from their superiors in the food premise. Thus there will be no necessity in formal food handling courses. This low level of mentality should not be instilled in a life of food service operators who always deal with foods for human consumption because this kind of attitude may jeopardize someone's life.

Besides that, a food business that was found to be operated without a valid license from the Local Authority will also be compounded and the value charged depending on the value set by the Local Authority without early notice. The failure to maintain a hygienic premise, food service operators' who neglected personal hygiene during food handling, as well as unhygienic food preparation will also be compounded.

In reference to the second independent variable of the conceptual framework which is the attitude towards food safety measured by food safety concern, self-improvement, and food hygiene, the result exposed that food service operators in Kedah have performed a fairly poor attitude in food safety. According to the obtained result in Table 4.11, food service operators in Kedah practice unfavourable attitude when it comes to food safety. These attitudes need to be upgraded and it is

highly hoped that both food premises' owners and food service operators have a sense of social responsibility to consumers while preparing foods to avoid food-related threats. The situation is in line with a statement made by both the respondents from qualitative interviews who stressed out that food service operators' attitude is always significant with food handling. Food service operators who practiced a positive attitude towards food safety always showed safe food handling and a sense of high responsibility to produce not only delicate dishes but most importantly food that is free from contamination.

The failure in getting typhoid injections among the food service operators was also a common offense found during the inspections as indicated by the first semi-structured interview respondent. He added, by referring to Section 11 of the Food Hygiene Regulations 2009, the food premises' owner shall not employ or permit any food handler to work on his premises unless they were given an anti-typhoid vaccine injection by a registered medical practitioner. The rules were applied to all food service operators whether foreign or locals (Section 11 of Food Hygiene Regulations 2009).

Generally, vaccination are safe because the benefits far outweigh the side effects that may arise to those with vaccine hesitation. Through vaccination, many serious diseases that were commonly found in previous generations such as typhoid fever, diphtheria, tuberculosis and polio disease were rarely detected in today's generation (Berita Harian Online, 2018).

Complementing to the qualitative analysis, based on the questionnaire survey in subsection 4.5.9, majority 75% of the respondents in Kedah have had their typhoid vaccination. However, the remaining 25% of the respondents who never had their vaccination shot yet still handling foods might expose the people to food threats as they might be the carriers of the disease.

By referring to Figure 5.1, Kedah is among the states with the highest vaccine refusal cases with 139 cases reported last year compared to 133 cases in the previous year, as stated by State Health Director Datuk Dr Norhizan Ismail (Astro Awani, 2019). In 2016, a total of 176 cases of vaccine refusal were recorded. One of the reason of vaccine declination in Kedah due to doubts in the status of the vaccination either it is *halal* or *haram*. Besides that, refusal in vaccination shot also due to sceptical understanding concerning contents in the vaccine dosage which were claimed to be unsafe for human intake. On top of that, family members' misconception about vaccination also contributed to the rise of anti-vaccine community in Kedah. This is because most people in Kedah practiced homeopathy and highly concerned with the side effects of the vaccine.

Apart from that, a lot of unverified information concerning vaccination has circulated widely on social media recently which has raised concerns from the Ministry of Health. This is due to the fact that there are group of people known as anti-vaccine community had influenced the public to reject vaccines with misconceptions ideology through the dissemination of invalid information. Besides that, these group of community also claimed that the National Immunization Program implemented by the Ministry of Health Malaysia is not beneficial and had caused a lot of adverse

effects, which creates fear among food service operators and the public (Kusnin, 2017).

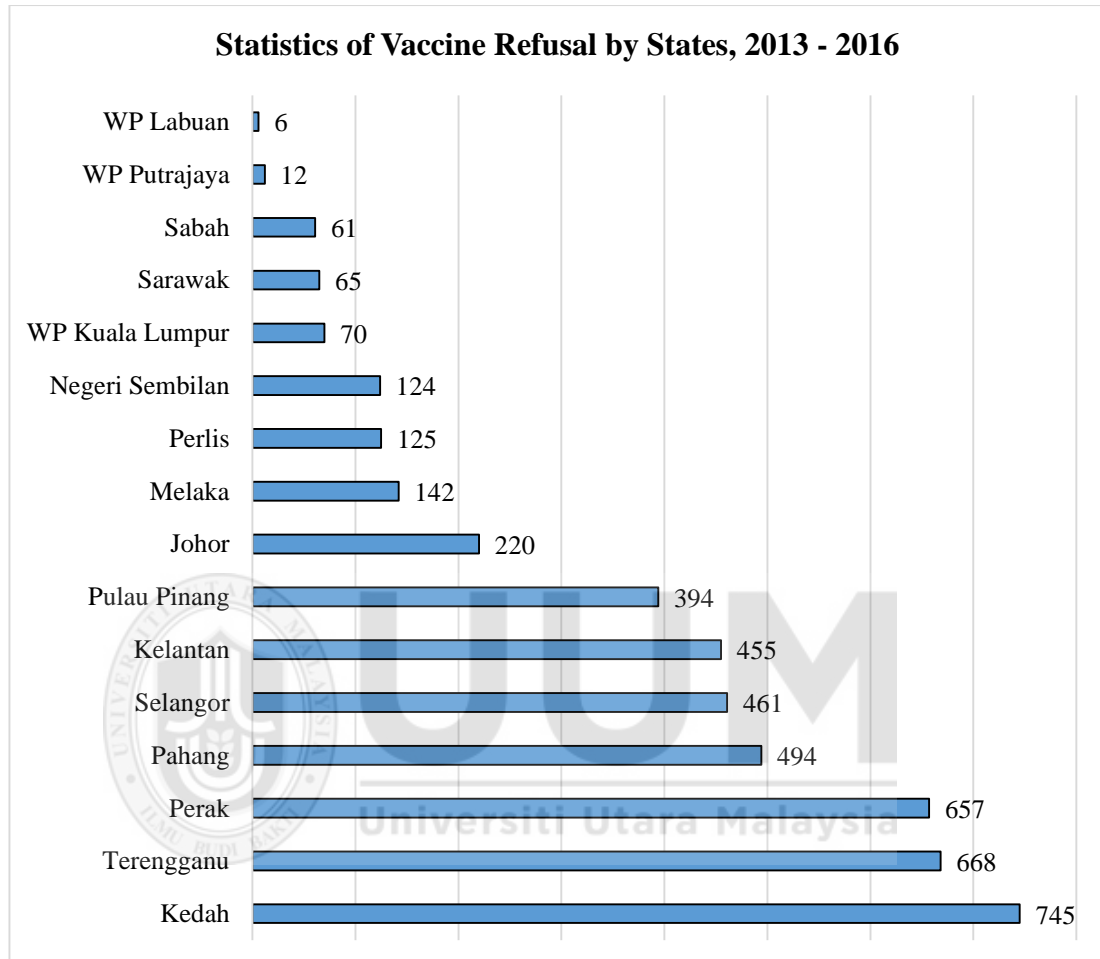


Figure 5.1: Statistics of Vaccine Refusal by States, 2013 – 2016.

Source: Kusnin, 2017.

Various efforts undertaken by the Ministry of Health Malaysia specifically to targeted groups identified as anti-vaccine community. For instance, the ministry provides support groups and referencing them to specialist. In addition, the ministry also seek cooperation from *ulamak* and personally approach the anti-vaccine community for health education and counselling. All of these measures were taken seriously by the government in order to convince the anti-vaccine community on the benefits of vaccination shots.

For instance, the injection was aimed at preventing food service operators from contracting typhoid disease and prevent the transmission to the public through food or beverages prepared by them. The respondents also stressed out that typhoid injections must be taken for all food service operators in every 3 years and must keep an injection card as evidence for further reference. The maximum of RM500 will be compound to the food service operators individually if they were found that the typhoid injection record has expired. The failure of both food premises' owners and food service operators to comply with the regulations can be fined not more than RM 10,000 or imprisonment for a term not exceeding two years. The dominance of foreigners as food service operators in Malaysia is feared because most of them were believed to have undergone neither food safety training nor undergoing health checks.

Conclusively, vaccination is one of the preventive measures against diseases that can be prevented through vaccines. Vaccination shot should not be taken lightly by food service operators. It should be highly emphasized. The issue of vaccine refusal is definitely a challenge for all of us. As a concerned society, extra attention and enforcement is very much needed pertaining to the anti-vaccine community as it affects not only the lives of the customers, but also will affect the community or population as a whole.

In regards to premise closure, a notice will be given and the premise's owner and is directed to immediate closure for 14 days for breach of regulation under Section 11 of the Food Act 1983. Along with the closure notice, a list of work instructions was also provided by the Health Officer for the premise's owners to improve and enhance

the hygiene quality of the premise. A re-inspection on the premise will be monitored periodically to ensure the premises do not conduct an unauthorized business during the shutdown period. The premise owner may apply to reopen the premise by submitting an application form within 14 days of closing. However, if 14 days of the closing period given has ended, a re-inspection at the premise will be carried out by the Health Officer. A letter of clearance will be released if the premise complies with all of the work instructions that have been issued. Then, the business will resume as normal as long as no violation against the Food Act 1983 was made.

Apart from that, the first respondent also stressed out that if there were complaints about food poisoning cases caused by food consumption at food premises, the Health Officers in charged will rush to the said premise and take food samples to be analysed. An analysis of the causes of food poisoning is usually done by comparing laboratory test results on suspected contaminated food samples and symptoms experienced by food poisoning victims.

This process, however, may take a longer time as it needs to be tested multiple times with several processes. An analysis of the food preparation process can also be made by interviewing all the food service operators who were responsible for food production to obtain a hypothesis of the cause of food poisoning. Therefore, the HACCP analysis method was adopted as an investigation method in finding the actual causes of food poisoning. The flowchart of food poisoning investigation based on the HACCP method is presented below.

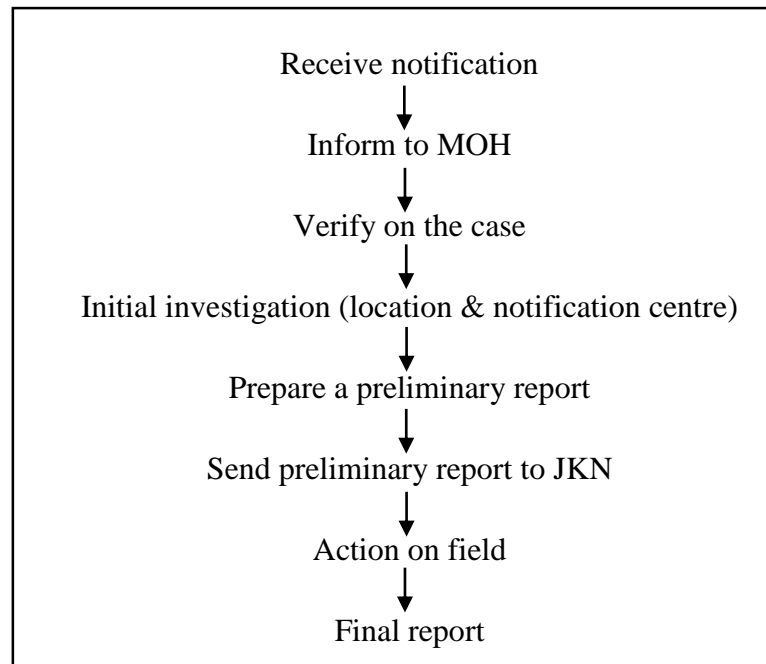


Figure 5.2: Flowchart of Food Poisoning Investigation Based on HACCP Concept
Source: Food Poisoning Guidelines based on HACCP Concept, Food Safety and Quality Division, Ministry of Health Malaysia, 2019 Edition.

The food poisoning cases that took place in Kampung Huma, Tanjung Dawai, Sungai Petani, Kedah was conducted by using the above mentioned guidelines. Based on the investigation and also the result from laboratory test, it was confirmed that chicken dish served at the wedding banquet were the primary source of food contamination which led to fatal food poisoning incident in 2013.

However, in answering to the first research question on the impact of food poisoning incidence to the food business, by referring to both statement by the first and second qualitative respondents, apparently there were a huge impact to the food premises despite the food poisoning cases. For instance, there were less food related incidents were recorded till December 2017 in Kedah. The respondents added, Kedah managed to be the top 5 states with least food related incidents consistently for the past 4 years. This could be due to the awareness from the food premises' owners as well as

the sense of responsibility portrait by the food service operators in minimizing the chances of food contamination at every food production stages.

Besides that, the huge difference in food poisoning cases recorded in Kedah since the fatal tragedy might also due to the rigorous approach from food governing agencies in Kedah in terms of training, awareness campaigns and frequent food premise inspection to significantly cater the possible causes of food contamination at the root cause. On the other hand, both researcher and respondents believed that this incident had posed a huge impact on the host family as well as both the bride and groom. They were still aggrieved and sad because they had no idea that the first wedding in the family will turned out into a disaster. More sadden, the deceased as well as the other victims were among their relatives and close friends. This fatal tragedy will never be forgotten.

5.4.2 Research Question 2: Who has the operational responsibility to ensure the food produced is safe for human consumption?

In an effort to combat malnutrition problems, the world population is still threatened by various forms of food-related issues. As mentioned by Bruins, Van Dael and Eggersdorfer (2019), lack of vitamins and minerals, obesity and as well as non-communicable diseases is also a huge concern in today's society. Relatively, the threats also involved an aspect of food safety. However, the food safety aspect is often taken lightly yet it is a very important element in food selection and human consumption.

Ensuring every food is cooked thoroughly, produced, eaten and marketed free from pollution and microbial infection is the major priority of every stakeholder in food production as stressed out by Malik, Sinhamahapatra and Kumar (2018). Food service operators are also part of the stakeholders. This is crucial because millions of people fall sick every year due to unsafe food intake (Raspor, Jevšnik & Ambrožič, 2016).

The complexity in the process of food production today has made food safety and quality control is never an easy task. This is because various sources of food contamination should be controlled at every stage of food production processes – from farm to fork. Many food safety-related incidents have opened the eyes of the public in demanding the government to take more serious action in ensuring all the foods produced locally are safe and free from any harmful sources that may expose the consumer to food poisoning cases. Therefore, the government and food-related agencies took various steps in maintaining the quality and safety of foods produced from the industrial level to the food premises. This is to ensure that the food sold is safe to be eaten.

However, what about the food safety control at homes? Therefore, in this case, the commitment of the consumer is required because as the researcher mentioned above, food contamination can occur at any stage of the food handling process. Hence, consumer awareness should also be enhanced through good personal hygiene practice, adequate food handling knowledge, and practicing good attitude in handling food.

The consumption of unhygienic food may cause foodborne diseases such as typhoid, food poisoning, and jaundice (Alum, Urom & Ben, 2016). The scholar also emphasized that food contamination can be caused by dangerous microbes such as *Salmonella*, *Escherichia coli* (*E. coli*), *Staphylococcus aureus* and others. These pathogens were transferred to food and beverages through unhygienic sanitation practices by the food service operators as well as dirty equipment. Therefore, by practicing hand hygiene before, during and after handling food is a basic step and crucial to ensuring foods prepared are not contaminated. Apart from that, cross-contamination can also occur when raw foods containing microorganisms were transferred to ready-to-eat foods (Valero et al., 2016).

Besides that, as stressed out by the second qualitative respondents, practicing proper food storage with the appropriate temperature should also be taken into account in order to avoid contamination. This is because microorganisms easily to multiply rapidly if foods left at room temperature. She also emphasized on maintaining the temperature below 5°C or above 60°C will retard the growth of microorganisms. Such basic things were often overlooked by the community, especially housewives during food preparation at homes until the food poisoning symptoms such as vomiting, diarrhoea, and abdominal pain occurred among the family members. Therefore, good food handling may prevent the risk of foodborne illness occurrence at homes.

On the other hand, the first qualitative respondents gave an opinion on food safety from an Islamic standpoint. He explained that, in Islam, the selection of clean and quality food is also an important aspect besides being halal. Islam strongly

emphasized spiritual and physical hygiene. Therefore, the element of hygiene should not be neglected to ensure that food consumed is safe to consume. However, most of our society today disregards the essential food safety aspects as much as halal elements were practiced. Concern over food safety may be underestimated due to lack of awareness and knowledge in each food handling processes. It also eventually describes one's attitude and practice.

Based on points elaborated by the qualitative respondents as above, all the points refer mainly to food service operators as they were the major players in food preparation and handling. Hence, a quantitative survey response was analysed in complementing the above statement. In essence, all the questions measuring food service operators were scored excellently, proving that the respondents aware of their huge responsibilities and roles in minimizing any causes of food-related threats. In a nutshell, both qualitative and quantitative evidence had demonstrated that food service operators play a major role in ensuring food produced is safe for human consumption. Besides that, it is an undeniable fact that government and food-related agencies were also no less important in keeping food consumed is free from food-related hazards.

5.4.3 Research Question 3: Why do the cases of food poisoning incidents keep increasing despite the establishment of food safety standards?

In response to answer the third and fourth research questions, a semi-structured interview approach was executed to both selected respondents. Therefore, the following conclusions have been derived from the content analysis.

By looking at the bigger picture, the issue of food safety is an issue of integrity whereas cleanliness is a human responsibility. Food-related issues are very closely linked to food service operators. Therefore, the government and food-related agencies have been cooperating in combating this never-ending food threats cases by upgrading food safety programs aiming at both consumers and food-related businesses. BeSS recognition, Guidelines, and Code of Ethics for Service Restaurants, Food Detection System Guidelines, and Food Premise Grading System were several established guidelines that can be used as a reference. By adhering with the set of rules set will not only benefit both business and food service operators but will also ensure the food served is safe and clean.

From the content analysis, both of the respondents agreed that amongst these three traits (knowledge, attitude, and practice) the attitude of food service operators were proven to be the factor that triggers the occurrence of food poisoning episodes despite the well-established of food safety standards. By referring to the statement from semi-structured interviews, both the respondents having the same opinion on negative attitude demonstrated by food service operators increases the risk of food poisoning case, thus will never put an end in food-related incidents despite on the upgraded food safety programs and various efforts done by the government and related food agencies in combating this issues. Supporting the statement, the result obtained in Table 4.13 revealed that the attitude of food service operators towards food safety possesses the smallest mean values compared to the other variables.

In conclusion, food service operators should strictly follow the established guidelines and conduct their duties in such responsibility without compromise so that they will

not risk the health and safety of the public. In this way, the establishment of a food safety standard can only consider success.

5.4.4 Research Question 4: Do the existing food safety standards support/assists food service operators' in conduction food preparation processes?

Prior to analysing the interview data, both the respondents disclose Food Act 1983, Food Hygiene Regulations 2009, BeSS recognition, MeSTi, and other food safety standards were established as a set of guidelines that control the safety of food in the country and thus protect the health of the people. Specifically, the set of regulations were established to ensure food premises were in clean condition, maintain personal hygiene of food service operators, underlines the proper attitude towards food handling, avoid practices that may contaminate food, using appropriate tools and equipment and all activities related to food handling practices at food premise. In short, these guidelines act as standardize enforcement activities as a form of food safety assurance programs such as HACCP, GMP, and GHP. For instance, BeSS recognition also assists consumers to choose a clean dining place which ensures the safety of food produced besides having an appropriate portion of foods.

In essence, Malaysian food safety standards have underlined all the important elements for each party related to the food business. Instead, these guidelines were supposed to assist food service operators in every single aspect of business operations from purchasing raw materials, up to selling foods to consumers. To support the above statement, Table 4.13 revealed the mean score of the dependent variable; the level of food safety compliance. The result has exposed that the level of food safety standard compliance in Kedah is satisfying since it has the highest mean

values amongst the variables. This proved that food safety guidelines do assist food safety operators in daily business routines. Besides that, by strictly practicing these set of guidelines, food service operators should be providing a clean and healthy food that is free from hazard consistently. However, both the respondents expressed that none of these regulations will be a success if there is no cooperation from the industry players as well.

5.4.5 Research Question 5: To what extend does food service operators' comply with food safety standards?

The fifth research question in the present study is to explore the level of food safety standard compliance by the food service operators. According to the statement from the first qualitative respondent, food service operators in Kedah moderately meet the quality level expected by the Ministry of Health. As mentioned beforehand, the number of employees being sent for official food safety training was limited due to the high turnover rate at the premises. Thus, the situation directly affects the level of effectiveness of the program.

In order to complement the above statement, a questionnaire survey analysis was run pertaining to food safety standard compliance. The questions contained in the second section of the questionnaire. All of the questions asked were merely based on BeSS guidelines, Food Act 1983 and Food Hygiene Regulations 2009. These are the main guidelines in food safety in Malaysia, hence the questions were derived from these established regulations. Based on the data analysis results provided in subsection 4.6.1, the overall result in explaining the food safety standard compliance level in Kedah is satisfactory thus supports the statement from the first qualitative

respondent. In a nutshell, all three traits in KAP model; knowledge, attitude and hygiene practices of food service operators pertaining to food-related activities have a significant relationship to the food safety standard compliance.

5.5 Contributions of the Study

The conducted present study and its findings have given rise to significant theoretical and practical contributions. These contributions were discussed further in the following sections.

5.5.1 Theoretical Contribution

The theoretical contribution of the present study has impacted the body of knowledge specifically on food safety concerns and policymakers by accessing the KAP model in elaborating the relationship among the variables. The results from the quantitative analysis proved that there was a significant relationship between food service operators' knowledge, attitude and hygiene practices that ensures whether or not the food prepared is free from food-related hazards. The findings show that there was an interconnection between these three traits that defined the results of food produced.

Another theoretical contribution from the present study is the actual cause that triggers the increasing number of food poisoning episodes in Malaysia. From the result obtained, strong evidence revealed that the attitude of food service operators was found to be the root factor that contributes to the food hazards. The high level of food safety knowledge and practicing a good hygiene practice were both fairly important however attitude possess by food service operators during the entire food

production chain is vital in determining the food produced is free from contamination and guarantees food safety to the public. It distinguishes the safety of food served.

Besides, the result of the present study also provides a further understanding of the theoretical contribution regarding the actual level of food safety standard compliance among the food service operators in the Malaysian context. To the researcher's knowledge, this is the first study attempt that evaluate the effectiveness of the law concerned either in terms of its application, implementation, enforcement and the impact of Malaysian food safety standards on food service operators and how these standards affect food service operators' in food production processes at the premise thus far. Therefore, the result of the present study has fulfilled the gap which will create new insight to be further explored in future research.

5.5.2 Practical Contribution

The present study also highlights practical insight into the food industry. The results from the present study have contributes to bridging the gap between practitioners and policymakers. Besides, policymakers can also make use of the research findings to review the importance, acceptance, and effectiveness of the existing food safety programs as well as programs that will be implemented in the future.

The unsatisfactory level of cleanliness in food premises and the increasing food poisoning reports have prompted the Ministry of Health Malaysia to formulate an aggressive food safety program pertaining to food service operators. Therefore, BeSS recognition has been introduced as one of the government's initiatives in addressing food poisoning problems in Malaysia. This certification recognizes food service operators who promote the provision of safe and healthy food. The recognition also

provides convenience to the public in choosing a clean restaurant to dine in. With this recognition, it is hoped that the program will be well accepted and executed by food service operators and subsequently boost their desires to maintain the cleanliness of the premises as well as providing a quality and healthy foods. However, the findings revealed contrarily.

The findings revealed that 63% of food service operators in Kedah were not aware of the existence of BeSS recognition although it has been implemented since 2013. More disappointing, 49% of the respondents felt insignificant on having food safety recognition in running food businesses. This result showed both good and bad indications from the enforcement agencies. However, this result indicates the need for reviewing and revising the Malaysian food safety surveillance as well as on the enforcement of legal and food hygiene practices among food service operators. This will be a means to ensure the real needs of established food safety certification.

5.6 Limitations

While the present study represents the significant role of the food safety management system in determining superior safety performance in the food industry, it should also be noted that some limitation exists in the present study. The limitation was further explained in the subsection as follows.

5.6.1 Under-Reported Food Poisoning Outbreaks

Whenever food poisoning outbreaks occurred in food premises and food businesses, the source of the outbreaks was often not reported. This probably maybe because of the identification process which is time-consuming and involved various laboratory

processes. The source of contamination might no longer be identified along the process.

Besides that, there were also food poisoning cases that were not reported as the victims cured the illness themselves by taking medication from the nearest pharmacist, or perhaps they practiced traditional methods to heal food poisoning illness such as by drinking apple cider vinegar, ginger juice, herbal tea, and other ingredients which easily available in everyone's home kitchens. Their refusal to seek formal treatments at the hospital may be due to the assumption that the illness is nothing serious, thus self-treatments are sufficient.

In addition, bulletins in organization and ministry official websites were either not updated or obsolete. Besides that, there were also materials from the website that was incomplete as well as unable to retrieve documents from related websites. The failure in accessing full reports and publications had caused restrictions to the researcher from obtaining valid data pertaining to the present study.

5.6.2 Generalization

It should be bear in mind that the present study was conducted in Kedah, which represents one out the 14 states in Malaysia in which the findings from this study cannot be generalized to all food service operators who were in line with food industries in other states and geo-political zones of the country. On top of that, the items used to measure each variable in the present study were based on single respondents' responses to the selected food premises. Hence, the data obtained represent a self-reporting by the respondents. Therefore, future researchers are

advised to consider the collection of data from multiple individuals in particular food premises or authorities in food industries in avoidance of common method bias.

5.6.3 Research Approach

As presented in chapter 3, the present study utilized both qualitative and quantitative research approaches in which each method provides complementary information that makes up for any limitations compared to using a single method only. However, it is advisable for future researchers to also run an observational research technique in the qualitative method as well which could pose a positive impact or influenced the interpretation of the finding in future research. This will add values to the research because this technique involves direct observation of a phenomenon in a natural setting which assists the researcher to observe the actual attitude and food handling practices of the selected respondents. Nevertheless, this technique might be time-consuming.

5.6.4 Failure in Approaching Crucial Respondents

The selection of appropriate respondents is crucial in every research study as the respondents' will respond to the given questions accordingly. The correct response and answer are needed to reach the objective of the research thus answer all of the research questions correspondingly. However, the researcher's failure in approaching the crucial respondents in the case study has given a huge impact on the data collection and interpretation of the findings. Despite the failure, it was an understandable situation if the respondents refused to be interviewed as they might not have recovered from the fatal tragedy even though it happened several years ago.

5.7 Suggestion for Future Research

There are a million cases of food contamination recorded yearly in Malaysia. This huge number is worrisome as it put human lives at risk. As a result of the findings, behavioural issues were found to be the main elements that influence one's practices which distinguish the safety of food served. Since all measures in the present study were merely focusing on policymakers and the food industry players, the researcher suggests on including the public's perception in future research as well. The public concern and opinion in choosing a restaurant to dine in are fairly important to avoid bias in the results. By doing this, this research has completely covered all of the important individuals involved in food safety circles which includes from the top key decision-makers, industry players to the end consumers to acquire more meaningful and concrete results. In the opinion of the researcher, it is best to cover perceptions from both sides. In this way, the future researcher will be able to verify the never-ending food-related phenomenon by comparing the results.

In regards to the limitation of data collection methods, instead of distributing questionnaires to the food service operators solely, future researchers are suggested to practice cross-sectional studies that involve observational study that analyses data from a population at a given point in time. In the researcher's opinion, a cross-sectional study is good at measuring the food disease prevalence which is the proportion of the population found to have a condition at a given point of time. In an observational study, the researcher does not influence the responses in any way, they just stand around and watch by looking at a pathology's occurrence between the practices of different age groups, different races, different cultures, and different geographic locations. Cross-sectional studies can also be used to compare two things

such as on-time behavioural practices and by comparing the answers in the questionnaire checklist. By doing this, the future researchers will have a better view of food service operators' actual habit when it comes to handling and serving foods at the premises. As a result, the finding of the research is hoped to be benefited from a deeper and better understanding regarding food-related issues in Malaysia which in return can be generalizable to the entire population of the study.

5.8 Conclusion

Food safety-related incidents have caught the attention of the public and demanding the key decision-makers to be more concern about the safety of food produced in the country. Therefore, the government took various measures by establishing food safety standards with the means to improve the quality of food produced by industrial entrepreneurs, food premises to the end consumers. For instance, the Food Act 1983 is the main legislation regulation food safety in the nation, complemented by Food Regulation 1985 and Food Hygiene Regulations 2009. All of these regulations form guidelines to ensure that food production is safe.

Food safety is a very crucial issue in the 21st century. This is based on the statement by Datuk Seri Ahmad Shabery Cheek, Minister of Agriculture who claimed that Malaysia is targeting to be the world's top 20 countries in food safety. By referring to the 2017 budget, the government has allocated a huge amount of budget; over 140 million ringgit in strengthening and expanding food production to overcome food security issues in Malaysia (Astro Awani, 2017).

On the other hand, the Ministry of Health has reminded Malaysian to always alert on the safety of food provided at a special occasion such as Hari Raya Aidilfitri open

houses and wedding banquet. Both guests and food service operators should practice the “look, smell, and taste” method before consuming. He also advised the public to be a smart consumer with prioritized health, hygiene and most importantly food safety.

Besides that, World Health Day which usually celebrated on 7th April each year highlighting health issues that should be given serious attention. With this year’s theme of “Food Safety – from farm to table” the campaign focuses on the responsibility of all food-related parties to ensure safe food supplies to the public.

Nevertheless, most of the public today disregard the importance of food safety aspects. For instance, in choosing a place to dine in. Based on the intensive interview with experts from the Food Safety and Quality Division, Ministry of Health Malaysia, it was revealed that Malaysian have had a habit to dine at food premises which offers delectable dishes and money worthy disregards of the dirty environment of the premises. Not to mention how food is prepared behind the walls and without a good irrigation system. For instance, “*mamak*” restaurants and roadside stalls. The Malaysian attitude that less is sensitive about hygiene poses the risk of food contamination to them.

In essence, data of the present study suggested that food service operators in Kedah were knowledgeable and have had a moderate hygiene practice, however with the low level of favourable attitude in food handling and preparation, the incidents of food poisoning outbreaks can never be resolved. Therefore, any food safety campaigns and such programs enforced by the government will never be a great

success if there are no changes in the attitude of the food service operators. There is always a possibility of food poisoning reoccurrence, and the next victims might be your loved ones, unless food service operators have had good attitudes to hold the responsibilities of minimizing food contamination at any cost.

Conclusively, all of the government's initiatives that have been implemented in combating food-related issues in the nation will not be well executed if there is no comprehensive cooperation from all parties. The money invested by the government to be the world's top 20 countries in food safety will be worthless. Therefore, everyone in the food business line must work hand-in-hand to maintain food produced that is free from any contamination at every production chain for human consumption.



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APPENDIX A

SEMI-STRUCTURED INTERVIEW CHECKLIST

BEFORE THE INTERVIEW

- Selected respondents
- Private setting for the interview site
- Equipment
 - Video camera
 - Power bank
 - Field notebook and pens
- Interview packet
 - Large, heavy duty envelope
 - Interview guide
 - Consent form
 - Validation forms
- Token of appreciation for participants

DURING THE INTERVIEW

- Completion of consent forms
- Introduction of interviewer
- Short explanation on the purpose of the interview
- Interview session starts
- Interview session ends

AFTER THE INTERVIEW

- Signed consent form
- Labelled interview guides with notes
- Video camera
- Signed validation form (after transcription)

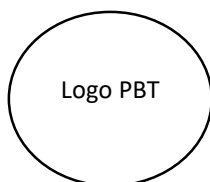
APPENDIX B

SEMI-STRUCTURED INTERVIEW GUIDE

1. Can you explain the current food safety level in Malaysia?
2. Does Malaysian Food Safety Standards assists food service operators in minimizing the risk of food safety incidents?
3. What are the major causes of foodborne illness that are caused by food service operators' faulty?
4. What are the impact of food poisoning incidence to the business?
5. Who has the operational responsibility to ensure the food produced is safe for human consumption?
6. Why do the cases of food poisoning incidents keep increasing despite the establishment of Malaysian food safety standards?
7. Do the existing Malaysian food safety standards support/assist food service operators in conducting food preparation processes?

APPENDIX C

FOOD PREMISE INSPECTION AND GRADING CHECKLIST



Borang JKT/KS/1



No. siri borang

BORANG PEMERIKSAAN DAN PENGGREDAN PREMIS MAKANAN

Nama Pelesen:		No. K/P Pelesen:	
Nama Syarikat:		No. Tel:	
Alamat Premis:		No. Ruj. Lesen:	
		Tarikh:	
		Masa:	Tamat
Pengendali:	Bil. Pengendali <input type="text"/>	Suntikan Pelalian Anti-Tifoid <input type="text"/>	Kursus Pengendali Makanan <input type="text"/>

Perkara	Komponen	Markah	Demerit	Catatan
A. Kawasan Penyediaan Makanan	A1. Kawalan suhu dalam penyimpanan dan penyediaan makanan. Peti sejuk: <ul style="list-style-type: none"> Suhu sejuk beku: -18°C hingga 0°C. Suhu dingin (chiller): 1°C hingga 4°C. 	12		CCP
	A2. Kawalan serangga perosak / LILATI yang efektif termasuk kawalan. <ul style="list-style-type: none"> Lipas Lalat Tikus Lain-lain haiwan 	1 1 1 1		
	A3. Kebersihan peti sejuk <ul style="list-style-type: none"> Peti sejuk sentiasa bersih Susunan makanan dalam keadaan teratur Tiada pencemaran silang 	1 1 1		
	A4. Kebersihan peralatan dan kemudahan memasak. <ul style="list-style-type: none"> Alas pemotong dan kain pengelap dalam keadaan bersih. Dilarang menggunakan kertas bercetak yang bersentuhan dengan makanan Peralatan kulinari sentiasa dalam keadaan baik dan bersih 	1 1 1		

Perkara	Komponen	Markah	Demerit	Catatan
A. Kawasan Penyediaan Makanan	A5. Sistem pelepasan asap dan haba	1		
	<ul style="list-style-type: none"> Berfungsi dengan baik serta tidak menimbulkan kacauganggu Kapasiti yang mencukupi dan efisien 	1		
	A6. Ruang kelesaan di antara peralatan dan dinding / lantai*.			
	<ul style="list-style-type: none"> Jarak minima yang sesuai untuk penyelenggaraan dan tiada kesesakkan. 	1		
Markah		25		

Perkara	Komponen	Markah	Demerit	Catatan
B. Kawasan Penyajian Makanan	B1. Kawalan suhu dan tempat mempamerkan makanan yang sesuai mengikut keaddan dan jenis makanan.	12		CCP
	<ul style="list-style-type: none"> Suhu makanan panas: $>60^{\circ}\text{C}$. Suhu makanan dingin: 1°C hingga 4°C. Suhu makanan sejuk beku: $<-18^{\circ}\text{C}$. 			
	B2. Peralatan kulinari yang digunakan untuk penyajian makanan perlu sentiasa dalam keadaan,*.			
	<ul style="list-style-type: none"> Bersih 	1		
	<ul style="list-style-type: none"> Tidak sumbing, retak atau karat 	1		
	B3. Kain pengelap, alas dan peralatan memotong mestilah:			
	<ul style="list-style-type: none"> Bersih 	1		
	<ul style="list-style-type: none"> Digunakan berasingan mengikut jenis kerja 	1		
	B4. Meja, kerusi dan peralatan hendaklah sentiasa:			
	<ul style="list-style-type: none"> Bersih Sempurna dan selamat* 	1 1		
Markah		18		

Perkara	Komponen	Markah	Demerit	Catatan
C. Pengendali Makanan	C1. Pemeriksaan kesihatan ke atas semua pengendali makanan. • Mendapat suntikan pelalian anti-tifoid • Menghadiri kursus Pengendali Makanan	6		CCP
	C2. Tahap kesihatan diri yang baik; • Berpakaian bersih dan bersesuaian • Memakai apron yang bersih dan berpenutup kepala • Berkuku pendek, bersih dan tidak memakai barang perhiasan diri • Berkasut • Tidak merokok • Tidak melakukan apa-apa perlakuan dan tindakan yang boleh menyebabkan pencemaran makanan	1 1 1 1 1 1		
	C3. Tiada masalah kesihatan yang berkaitan dengan pencemaran makanan	1		
	Markah	13		

Perkara	Komponen	Markah	Demerit	Catatan
D. Sistem Bekalan Air	D1. Sumber bekalan air yang selamat. • Terawat • Bersih dan mencukupi	1 1		CCP
	D2. Penggunaan sumber bekalan air • Diambil terus dari paip • Dilarang penggunaan paip getah	1 1		
	D3. Tiada kebocoran paip di premis	1		
	Markah	5		

Perkara	Komponen	Markah	Demerit	Catatan
E. Kemudahan Sanitasi	E1. Keadaan kelengkapan kemudahan tandas.			CCP
	• Bersih dan bebas dari bau busuk	1		
	• Sempurna dan berfungsi dengan baik	1		
	• Kedudukan pintu tandas tidak boleh menghala terus ke kawasan penyediaan makanan	1		
	• Pengudaraan yang sempurna	1		
	• Bekalan air mencukupi	1		
	• Disediakan sabun dan tisu/alat pengering	1		
	E2. Kemudahan mencukup			
	• Sinki yang mencukupi	1		
	• Perangkap sisa makanan, minyak dan lemak (FOG) berfungsi dan diselenggara dengan baik	1		
	• Kapasiti perangkap (FOG) yang bersesuaian	1		
	E3. Kemudahan tempat mencuci tangan			
	• Bersih	1		
	• Sempurna	1		
	• Kemudahan sabun cecair dan pengering tangan*.	1		
Markah		12		
F. Struktur dan Penyenggaraan Premis	F1. Keadaan lantai, dinding dan siling.			CCP
	• Tidak licin / tahan lasak	1		
	• Mudah dibersihkan	1		
	• Kalis air	1		
	• Tidak menakung air / rata	1		
	• Bebas dari sesawang, habuk, kulat			
	F2. Sistem pengudaraan dan pencahayaan.			
	• Mencukupi	1		
	• Berfungsi*.	1		
	F3. Sistem perparitan yang sempurna.			
	• Bersih	1		
	• Diselenggara dengan baik *. (Tiada kerosakan)	1		
	F4. Sistem pengurusan air limbah yang sempurna*.			
	• Mengalir lancar	1		
	• Tiada sisa makanan	1		
Markah		11		

Perkara	Komponen	Markah	Demerit	Catatan
G. Lain-lain (Generik)	G1. Maklumbalas pelanggan	5		CCP
	G2. Kemudahan tong sampah yang mencukupi, berpenutup, bersih dan berkarung.	1		
	G3. Bahan makanan dan bahan kimia hendaklah disimpan secara berasingan. Kedua-duanya mestilah dilabel.	1		
	G4. Penyediaan dan pengurusan stor yang baik. (FIFO, kalis LILATI)			
	• Susun atur dan ruang kelegaan	1		
	• Kebersihan	1		
	• Pengudaraan dan pencahayaan.	1		
	G5. Amalan pengurusan sisa pepejal yang baik (pengasingan di punca.	1		
	G6. Premis dan peralatan perlu disenggara dengan baik dan jadual pembersihan mestilah dipantau secara berterusan.	1		
	G7. Notis pemberitahuan kebersihan, amalan keselamatan, pendidikan kesihatan, larangan merokok dan premis sijil The Blue Ribbon*.	1		
	G8. Kawasan dan keselamatan di premis makanan.			
	• Alat pemadam api	1		
	• Peti pertolongan cemas	1		
	• Ruang tangga bebas dari sebarang halangan	1		
Markah		16		

Nota:

Tanda (x) di ruang demerit

*Jika berkenaan.

JUMLAH MARKAH (100 – Perkara [A + B + C + D + E + F + G]) =

Atau

JUMLAH MARKAH = [(x – y) / x] x 100% =

Di mana:

x = Jumlah markah berdasarkan komponen yang telah diambil kira.

y = Jumlah markah demerit.

Julat Pemarkahan (%)	Penarafan	Gred yang Diperolehi (Tandakan ✓)
86 – 100	A	
71 – 85	B	
51 – 70	C	

Nota: -50% dan ke bawah adalah tidak layak untuk mendapat sebarang penarafan Gred, tindakan penutupan premis akan dijalankan.

- Premis perlu mendapat markah penuh bagi item A1, B1, dan C1 (CCP) untuk mendapat penarafan Gred A.

Cop Rasmi Pegawai Pemeriksa

.....
(
Nama dan Tandatangan Pegawai Pemeriksa



UUM
Universiti Utara Malaysia

.....
(
Nama dan Tandatangan Penerima / Saksi
No. K/P / Passport:

APPENDIX D

SELF-ADMINISTERED QUESTIONNAIRE SURVEY



SCHOOL OF TECHNOLOGY MANAGEMENT AND LOGISTICS UNIVERSITI UTARA MALAYSIA

A STUDY ON FOOD SAFETY IN KEDAH

Assalamualaikum and good day.

Dear valued respondents,

With the reference the above matter, please be informed that your premise has been selected as a respondent for the above mentioned academic research. Your responses are crucial in helping to better understand on food safety in Kedah, which focuses on the food service operators.

I would feel truly honoured if you can participate in answering the given questionnaire survey which only takes approximately 10-15 minutes to complete. Your answer to this survey questions are **STRICLY CONFIDENTIAL** and no individuals' answers can be linked back to your premise. The content will fully utilize for **ACADEMIC PURPOSES ONLY**. However, your participation is on a voluntary basis and you are free to withdraw at any time without penalty.

Your willingness and cooperation in participating in this survey questions is highly appreciated and crucial to the outcome of this study. If you have any question in regards to this study, please do not hesitate to contact me at 013-4507512 or by email at fatinaimanjwr@gmail.com.

Thank you for your time and cooperation. A souvenir will be given upon completion, as a token of appreciation in participating in the questionnaire survey.

Yours sincerely,

FATIN AIMAN BT ABD LATIFF
Postgraduate Student,
School of Technology Management & Logistics,
Universiti Utara Malaysia
06010 Sintok, Kedah

A STUDY ON FOOD SAFETY IN KEDAH

SECTION A: DEMOGRAPHIC QUESTIONS

Below are the questions related to your personal background. All of these questions will only be used for the study purposes only. Please tick (✓) in the appropriate box and fill in the blanks if applicable.

1. Gender: Male ☐ Female ☐

2. Religion: Islam ☐ Hindu ☐ Buddha ☐ Kristian ☐

Other (please state): _____

3. Age category _____ (please state)

4. Highest education level: ☐ Primary level
☐ Secondary level
☐ Diploma
☐ Bachelor's degree
☐ No education

5. Working experience in the food industry: _____ years (please state)

6. Have you ever participated in any food safety training? ☐ Yes ☐ No

7. Do you know about the "BeSS" recognition? ☐ Yes ☐ No

8. Is "BeSS" recognition important to you? ☐ Yes ☐ No

9. Have you had your typhoid injection? ☐ Yes ☐ No

SECTION B: FOOD SAFETY STANDARD COMPLIANCE

Read carefully on the following statements and please state your opinion according to the given scale.

Scale:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Food service operators are responsible for getting an anti-typhoid vaccine to control the spread of typhoid fever.	1	2	3	4	5
2	Knowing the temperature of the refrigerator is important to reduce the risk of food damage.	1	2	3	4	5
3	The use of hat, face mask, protective gloves and a proper clothing while handling food can reduce the risk of food poisoning.	1	2	3	4	5
4	The safe temperature for cooked food is > 63°C for hot dishes and <-5 °C for frozen foods.	1	2	3	4	5
5	Pest control devices are working and in a good condition.	1	2	3	4	5
6	Wiping cloth is always in a clean state.	1	2	3	4	5
7	The environment and food storage equipment is in a clean condition.	1	2	3	4	5
8	Food preparation in advance before the actual serving time increases the risk of food poisoning.	1	2	3	4	5
9	Using a knife and different cutting boards when preparing wet and dry ingredients.	1	2	3	4	5
10	Food service operators should be free from any illness that can harmful to the food prepared.	1	2	3	4	5
11	The use of any kinds of jewellery should be avoided when preparing food.	1	2	3	4	5
12	Adequate amount of garbage bins provided and covered trash bins.	1	2	3	4	5
13	The purchases of raw materials that is displayed together with chemicals should be avoided.	1	2	3	4	5

SECTION C: FOOD SAFETY KNOWLEDGE

Read carefully on the following statements and please state your opinion according to the given scale.

Scale:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Bacterial contamination occurred because of the wrong selection of raw materials.	1	2	3	4	5
2	Bacterial contamination occurred because of the improper ways of food storage.	1	2	3	4	5
3	Bacterial contamination occurred because of the improper ways of food preparation.	1	2	3	4	5
4	Bacterial contamination occurred because of the attitude of food service operators' who ignores food safety while preparing food.	1	2	3	4	5
5	Food contamination can occur at any stage of the food handling process.	1	2	3	4	5
6	Cross contamination is a major factor contributing to food poisoning. <i>*Cross contamination is a physical movement or the transfer of harmful bacteria from one person, an object or place to another.</i>	1	2	3	4	5
7	Typhoid disease (typhoid fever) is spread through foods and drinks that have been contaminated by faeces.	1	2	3	4	5
8	Certification in food safety assist food service operators to prepare and serve safe food to consumers.	1	2	3	4	5
9	Selection of fresh raw materials will leads to a healthy food that safe to be eaten.	1	2	3	4	5
10	Improper food storage can be harmful to consumers.	1	2	3	4	5
11	Cooked foods should be kept separately from raw materials.	1	2	3	4	5
12	Foods that were heated repeatedly increase the risk of food contamination.	1	2	3	4	5

SECTION D: ATTITUDES ON FOOD SAFETY

Read carefully on the following statements and please state your opinion according to the given scale.

Scale:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I think cooking food thoroughly ensures food safety.	1	2	3	4	5
2	I think food safety is always more important than taste.	1	2	3	4	5
3	I will read more information on food safety to improve my food safety knowledge.	1	2	3	4	5
4	I think that it is okay to touch exposed food with bare hands.	1	2	3	4	5
5	I will keep on preparing food even though I am in an unhealthy condition.	1	2	3	4	5
6	I always use the same wiping towel to clean the counters and also cooking utensils.	1	2	3	4	5
7	I think wearing jewellery when preparing food is not an issue.	1	2	3	4	5
8	I often ignore my self-appearance during my working time.	1	2	3	4	5
9	I will choose the processed foods in unopened packaging.	1	2	3	4	5
10	I always thaw frozen foods repeatedly.	1	2	3	4	5
11	I always store the leftovers in the refrigerator very close to one another to make space.	1	2	3	4	5
12	I always cut the raw materials to the appropriate size to speed up the cooking process.	1	2	3	4	5

SECTION E: HYGIENE PRACTICES

Read carefully on the following statements and please state your opinion according to the given scale.

Scale:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

			Strongly Disagree	Disagree	Neutral	Agree
1	During the food preparation process, I always choose fresh raw ingredients.	1	2	3	4	5
2	I will use the expiry date as a guide to determine the safety of the food.	1	2	3	4	5
3	I am responsible for separating raw foods and cooked foods in different spaces.	1	2	3	4	5
4	I will ensure that raw materials such as meat and fish kept in a freezer as soon as possible after cleaning to prevent damage.	1	2	3	4	5
5	I always leave frozen food (frozen) thawed at room temperature before using them.	1	2	3	4	5
6	I stored leftovers in the refrigerator for more than five (5) days.	1	2	3	4	5
7	I always store all perishable foods in the refrigerator after my shift ends.	1	2	3	4	5
8	I will keep the trash cans closed at all time.	1	2	3	4	5

- END OF QUESTIONNAIRE SURVEY-

**KINDLY RETURN THE COMPLETE QUESTIONNAIRE TO THE RESEARCHER IN
EXCHANGE WITH YOUR SOUVENIR.**

THANK YOU

APPENDIX E

EXAMPLE OF QUALITATIVE CONTENT ANALYSIS SHOWING MEANINGFUL CONDENSATION, ABSTRACTION AND FORMULATION OF THEMES

Respondent	Meaning Unit	Condensed Meaning Units	Code	Category	Theme
R2	<p>They have appropriate food safety knowledge because they always cook at home for their families.</p> <p>But they don't have experience in handling a lot of food in one time.</p> <p>This is their first time cooking food in large quantity.</p>	<p>Having food safety knowledge because always cook at home.</p> <p>No experience in handling a lot of food in one time.</p> <p>First time cooking in large quantities.</p>	Inexperience in handling huge amount of food.	Poor handling practices	Inexperience food service operators messed up cooking
R2	Surprised that the chicken is not frozen even though was fridge overnight.	The raw chicken is not in frozen state.	An improper storage of the raw chicken had resulted in <i>salmonella</i> bacteria contaminants.	Poor handling practices	Time and temperature abuse, the silent killer.
R1 & R2	The chicken is not frozen, only chills.	The raw chicken only chills.			
R1 & R2	Bacteria multiply rapidly at this stage.	Bacteria multiply rapidly.			

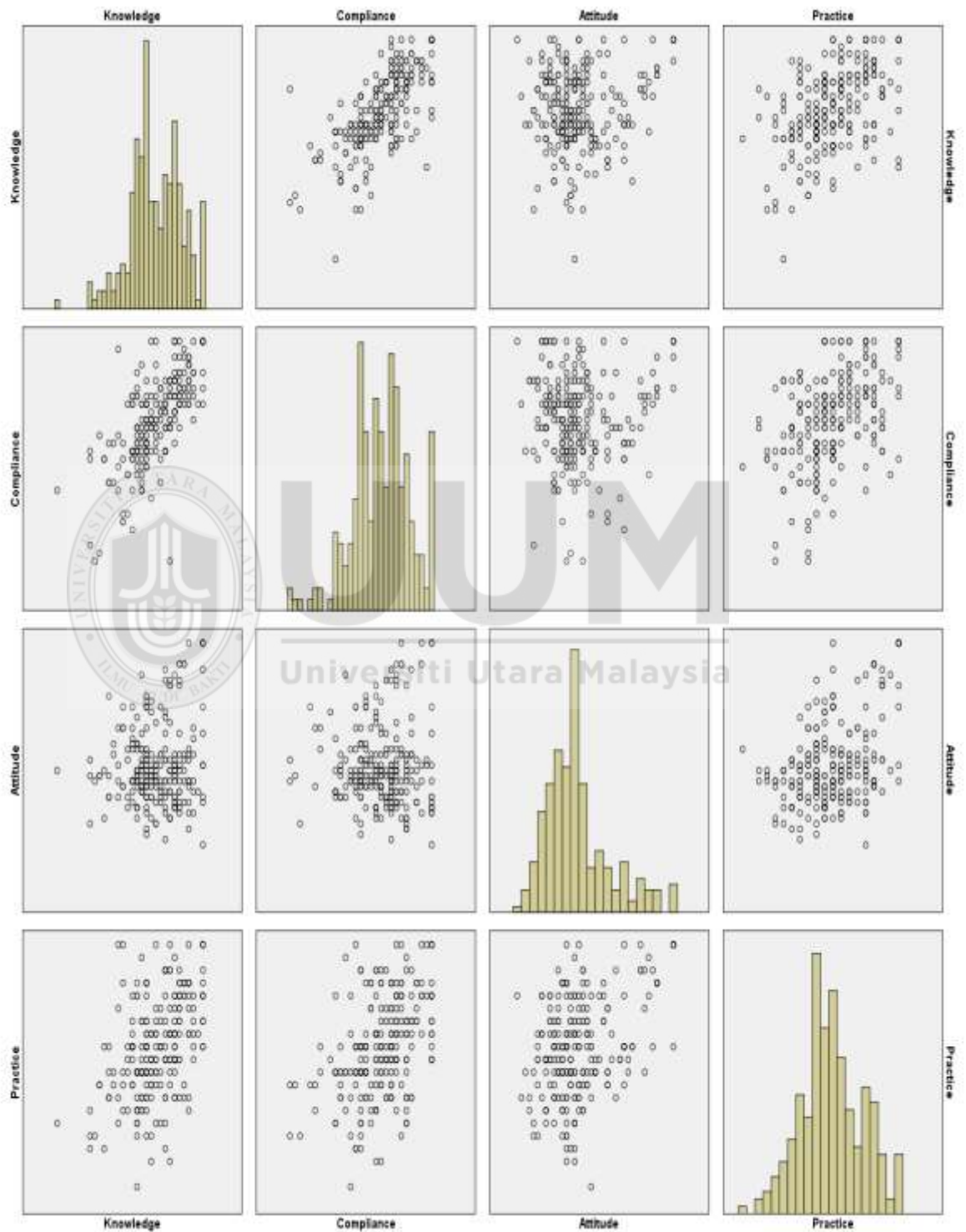
APPENDIX F

TABLE FOR DETERMINING SAMPLE SIZE

S	N	S	N	S	N	S	N	S	N
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

APPENDIX G

SCATTER PLOT



APPENDIX H

FORM OF CONSENT (1)

This form is intended to seek your permission to participate in an interview for an academic research purpose. Please read the following statement and sign your name, indicating your approval.

I hereby declare that I agree to participate in an interview session that will be conducted by Miss Fatin Aiman bt Abd Latiff. I am well informed about the purpose of the interview. I am fully aware that the interview session is tape recorded and confidential. All the details given during the interview session only for academic purposes.

Name : _____

Signature: _____

Date : _____

APPENDIX I
FORM OF CONSENT (2)

This form is intended to seek your permission to participate in an interview for an academic research purpose. Please read the following statement and sign your name, indicating your approval.

I hereby declare that I agree to participate in an interview session that will be conducted by Miss Fatin Aiman bt Abd Latiff. I am well informed about the purpose of the interview. I am fully aware that the interview session is tape recorded and confidential. All the details given during the interview session only for academic purposes.

Name : _____

Signature: _____

Date : _____

APPENDIX J

FORM OF VALIDATION (1)

This form is intended to verify interview transcription. Please read the following statement and sign your name, indicating your approval.

I hereby declare that I have proofread the interview transcription given to me. I have agreed and approved the interview transcription.

Name : MUHAMMAD ZULHIMAM BIN YACOB
Signature: 
Designation: FOOD TECHNOLOGIST



Universiti Utara Malaysia

APPENDIX K

FORM OF VALIDATION (2)

This form is intended to verify interview transcription. Please read the following statement and sign your name, indicating your approval.

I hereby declare that I have proofread the interview transcription given to me. I have agreed and approved the interview transcription.

Name : NUHMAHATH ABUL HALIM
Signature: 
Designation: PEGAWAI TEKNOLOGI MAKANAI